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Perceived discrimination and risk of preterm birth among Turkish immigrant women

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International immigrants (i.e., persons living in a country other than where they were born) are a rapidly growing global population (United Nations, Department of Economic and Social Affairs, 2017). Disparities exist between immigrants and the native population, particularly regarding adverse health outcomes, including negative pregnancy and birth outcomes, that are more prevalent among immigrants and other minority groups (Giscombé and Lobel, 2005; Jasienska, 2009; Mehta and Ylitalo, 2013; Vega et al., 2009). The association between immigrant or minority status and adverse birth outcomes is particularly well documented in the US, where African-Americans exhibit higher rates of preterm birth (PTB, i.e., birth before completion of 37 weeks of gestation) than European Americans and Hispanics (Culhane and Goldenberg, 2011; Goldenberg et al., 2008; Hamilton et al., 2017). Given that PTB is one of the major risk factors for early child death (Liu et al., 2012), later developmental impairment (Saigal and Doyle, 2008), and even higher PTB risk in the offspring generation (Dorner et al., 2017; Porter et al., 1997), it is essential to examine its antecedents.

The underlying causes and pathophysiological mechanisms linking immigrant status and adverse health outcomes, including PTB, are not well understood. Commonly assumed pathways by which migration may affect health include some of the unfavorable social and

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psychological sequelae of immigrant status (e.g., increased levels of psychosocial stress, declining social ties, socioeconomic decline). In the context of psychosocial stress among immigrants, the role of discrimination due to race/ethnicity or origin has been discussed and investigated in ethnic minority samples (Williams and Mohammed, 2009). Discrimination describes the marginalization and disadvantaging of certain groups, that can be structural (e.g., policies that disadvantage certain groups) or can occur in social interactions (Seymour-Smith, 1986). Although individuals may be exposed to exclusion or harassment due to their membership of a group to a similar extent (e.g. race/ethnicity, origin, gender, religion), individual differences may exist in one's personal perception and concern about such treatment, which is captured in the concept of *perceived discrimination*. Perceived discrimination thus reflects an individual's disposition regarding how to perceive often ambiguous situations (Diehl and Liebau, 2017).

A growing body of evidence suggests a link between perceived discrimination and health outcomes in ethnic minority groups such as worse general self-rated health, a higher prevalence of hypertension and greater cardiovascular reactivity, more psychological distress, less personal well-being, and more depression and anxiety (Paradies, 2006; Paradies et al., 2015; Pascoe and Smart Richman, 2009; Williams et al., 1997; Williams and Mohammed, 2009). The adverse effects of perceived discrimination may not only affect the individual directly exposed, but may also be transmitted to their offspring. For example, several studies provide evidence that racial discrimination substantially contributes to the higher risk to give birth at preterm and to low birth weight newborns among African-American women in the US (Alhusen et al., 2016; Bower et al., 2018; Chae et al., 2018; Collins et al., 2004; Dole et al., 2004; Dominguez, 2008; Giscombé and Lobel, 2005; Giurgescu et al., 2011; Rosenberg, Lynn; Palmer, Julie R.; Wise, Lauren A.; Horton, Nicholas J.; Corwin, 2002). This link does not seem to be moderated solely by socio-economic disadvantage – another risk factor of PTB, as for example, racial disparities in birth outcomes were also observed among African-American women with higher socioeconomic status (Adams et al., 1993; Collins et al., 2007; Muglia and Katz, 2010).

Potential pathways through which discrimination contributes to different kinds of health adversities have been described (Giscombé and Lobel, 2005; Pascoe and Smart Richman, 2009). Discrimination may be associated with restricted access to social (employment, housing, education, etc.) and health resources (preconception care, prenatal care, etc. (McLemore et al., 2018)) due to discriminatory/racist policies and/or an individual's expectation of being treated disadvantageously. Moreover, it has been proposed that perceived discrimination constitutes an uncontrollable and unpredictable stressor that triggers a biological stress response (e.g., activation of the sympathetic nervous system and the hypothalamic-pituitary-adrenal (HPA) axis, resulting in elevated blood pressure, increased heart rate, and cortisol secretion). Given a strong link between maternal stress and risk of PTB (Pathik D Wadhwa et al., 2011), the stress aspect of perceived discrimination deserves special attention. Chronic activation of these systems is associated with detrimental effects on health in the long turn (Clark et al., 1999). Furthermore, perceived discrimination promotes maladaptive health behaviors such as smoking (Bennett et al., 2005; Landrine and Klonoff, 1996) and alcohol use (Gilbert and Zmore, 2016). These sequelae of perceived discrimination – subjective stress experience, biological stress response, smoking and

alcohol consumption – are well-described risk factors of PTB (Goldenberg et al., 2008; Pathik D. Wadhwa WadhwaWadhwa et al., 2011). Thus, maternal perceived discrimination may affect adverse pregnancy and birth outcomes through these various stress-related pathways.

The above-mentioned link between perceived discrimination and health outcomes in general, and birth outcomes specifically, has predominately been examined in samples of US-based immigrant or minority groups such as African-Americans and Hispanics. There are only very few studies on immigrants in Europe that address the relationship between perceived discrimination and health (Karlsen and Nazroo, 2002), and to our knowledge, there are no studies so far that have investigated the link between maternal perceived discrimination and obstetric or birth outcomes.

In the present study, we focused on Turkish immigrants in Germany because (1) they constitute one of the largest migrant groups in Germany (around 3 million, including those who migrated from Turkey to Germany and their descendants, referred to as 2nd and 3rd generation immigrants) (Statistisches Bundesamt, 2016), (2) they exhibit an enhanced risk of socioeconomic disadvantage in terms of poverty, unemployment and educational deficits, which poses a risk for health in itself (Müller and Stanat, 2006; Robert Koch-Institut, 2015), (3) while in some respects, Turkish immigrants may be as healthy or even healthier than the host population, there is evidence that those living in Germany (and other European countries) are at increased risk for a number of physiological and mental health impairments and unfavorable health behaviors (Igde et al., 2018; Reiss et al., 2015; Robert Koch-Institut, 2015), and (4) although it seems that there is a general decrease of perceived discrimination among Turkish immigrants in Germany over the last decade, still more than half of the participants of a longitudinal study in 2015 reported perceptions of being disadvantaged due to their origin in several areas of life over the past two years (Sauer, 2016).

Regarding health disparities in the context of pregnancy and birth, some studies have suggested that Turkish immigrant women have a higher prevalence of pregnancy complications such as gestational diabetes (Reeske et al., 2012), anemia (David et al., 2014, 2006), stillbirths (Reeske et al., 2011), and across Europe, the mortality risk of newborns is increased among Turkish immigrant women compared to the autochthonous populations (Gissler et al., 2009). The evidence on PTB risk among Turkish immigrant women is mixed. An analysis that used data from the KIGGS study, a longitudinal study on children's health in Germany, revealed a significantly higher risk of PTB (17.3%) for women who originated from North Africa and the Middle East (incl. Turkey) compared to German autochthonous women (11.2%) (Weichert et al., 2015). In line with this, a study using data from the German Socio-Economic Panel (SOEP) study indicated a 3.5-fold higher PTB risk for 1st generation Turkish immigrant women compared to German autochthonous women (Becker and Stolberg, 2013). In contrast, the most recent results from the Berlin perinatal study showed that spontaneous PTB was less common among 1st generation Turkish immigrants (3.5 %) than in German autochthonous women (9.0%) (David et al., 2017). Finally, one study using a nationwide German perinatal database indicated no differences in the PTB risk between immigrant women from North Africa and the Middle East (incl. Turkey) and German women (Reeske et al., 2011).

Given the mixed results of studies addressing PTB risk in Turkish immigrants and limitations in the current literature regarding the role of perceived discrimination in the context of health disparities among Turkish immigrants (Igel et al., 2010; Schunck et al., 2015), the aim of our study was to investigate the relationship between perceived discrimination and PTB in Turkish immigrant women in Germany using data from the SOEP study, a German-wide representative panel study with an oversampling of the immigrant population (Wagner et al., 2007). A higher prevalence of PTB among Turkish immigrant women in the birth cohorts in the SOEP sample between 2002 and 2011 has previously been reported (Becker and Stolberg, 2013). We wanted to replicate this finding using the additional data collected since then. Furthermore, we examined the relationship between perceived discrimination and PTB, and also accounted for potential differences between 1st and 2nd generation Turkish immigrant women. The following hypotheses were tested:

1. The risk of PTB is higher among Turkish immigrant women (1st or 2nd generation) compared to German autochthonous women.
2. Maternal perceived discrimination is associated with an increased risk of PTB among Turkish immigrant women.

Methods

Data

We used data from the German Socio-Economic Panel (SOEP), a longitudinal nationwide panel study that has been conducted annually since 1984 (Wagner et al., 2007). Informed consent was obtained from all individual participants included in the SOEP study. Since 2003, the newborn questionnaire (“Mother-Child: Age 0–1”) has been applied as part of the SOEP survey at the annual assessment in case a baby was born in a participating household within the first year after delivery. This instrument captures information on birth outcomes and post-partum development of the child that we used in our study. Additional variables that were used in our analyses were gathered partly from surveys administered before birth. We included data from the surveys between 2002 and 2016. Women were included if they belonged either to the group of “autochthonous women” or “Turkish immigrant women” (see below). Twin births and pregnancies that were initiated with medical support (e.g., hormonal treatment, in vitro fertilization) were excluded from the analyses. The final sample comprised $N = 2,525$ of which $n = 217$ (8.60%) were Turkish immigrant women. Data on perceived discrimination was available for $n = 111$ Turkish immigrant women. Descriptive characteristics of the sample are shown in Table 1.

Measures

Preterm birth (PTB).—The occurrence of PTB was derived from maternal self-reported gestational age at the time of delivery from the item “In which gestational week your child was born?” from the newborn questionnaire. Preterm birth was defined as gestational age < 37 weeks, and we created a dummy variable with “0” indicating no preterm birth (> 37 weeks of gestation) and “1” indicating the occurrence of preterm birth (< 37 weeks of gestation).

Immigrant status.—We included Turkish immigrant and autochthonous women who completed the newborn questionnaire. Immigrant status was derived from the women's country of origin and their parents' country of origin. Women were identified as autochthonous when they and both of their parents were born in Germany. Women were identified as Turkish immigrants if they were born in Turkey (1st generation immigrants) or if they were born in Germany but at least one parent was born in Turkey (2nd generation immigrants).

Perceived discrimination.—Subjective perception of discrimination was assessed in Turkish-origin women by a single item that asked how often the respondent had perceived discrimination due to his/her origin within the last year (in waves 2002–2013) or within the last two years (in waves 2015, 2016), respectively. The item was not applied in the years 2012 and 2014. Answers were provided a three-point Likert scale (“1” never, “2” seldom, and “3” often). We used data from the survey immediately before birth to capture the point in time when mothers were pregnant or close before pregnancy, thus the maximum length of time between the completion of this item and delivery was 12 months. Data on this item was available for $n = 111$ Turkish-origin women. The missing data rate of 48.85% was due to missing item-level data (12.90%), because the item was not administered in the waves 2012 and 2014 (9.22%), and because some women not yet participated in the SOEP study before they gave birth (26.73%). Of these 111 women, $n = 9$ reported “often”, $n = 37$ “seldom” and $n = 65$ “never” perceived being discriminated against. Due to the unequal distribution of the answers, this variable was recoded into a dummy variable with “0” representing *never* and “1” combining the categories *seldom or often* for our analyses.

Covariates.—The adjusted models included infant sex, maternal age, parity (indicated by number of children), and years of education, which is a widely used indicator for socioeconomic status in health research (Shavers, 2007). In the adjusted model that was applied in the Turkish subsample only, generation status (1st vs. 2nd generation) was also added as a covariate.

Additional potential confounders and risk factors for PTB that should ideally be considered are maternal smoking during pregnancy, body mass index (BMI), and pregnancy complications (e.g., hypertension, preeclampsia, severe infections) (Goldenberg et al., 2008). However, the SOEP survey does not include any questions on pregnancy complications, and smoking and weight are assessed every two years only. Thus, analyses that included smoking and BMI as additional covariates could only be conducted in a smaller subsample and are reported in a footnote.

Data Analysis

Descriptive analyses included group comparisons between autochthonous and Turkish immigrant women. T-tests were used for numeric variables for which Cohen's d is reported as a measure of effect size, and χ^2 -tests were conducted for binary variables with odds ratio (OR) as an indicator of effect size. For the main analyses, we used logistic regression models with PTB as a dichotomous outcome variable. We conducted two sets of analyses: First, we inspected the whole sample including autochthonous and Turkish immigrant women and

examined differences in PTB risk based on immigrant status. Second, within the sample of Turkish immigrant women, we investigated PTB risk by perceived discrimination (data on perceived discrimination due to origin was not available for autochthonous women). The analyses were hierarchical, beginning with an unadjusted model that included only the relevant predictor variable (immigrant status or perceived discrimination) and continuing with an adjusted model that included additional covariates.

To enhance the interpretability of the estimates, all metric independent variables were centered around the grand mean. The *OR* for the predictors was derived including confidence intervals (95%, two-sided). All analyses were run in R (R Core Team, 2017) using the *glm()*-function, which takes only complete cases into factor. R^2 as reported in the result tables indicates the amount of variance explained by the model compared to a null model with only an intercept and without any predictor variables. There were no significant group differences between Turkish-origin respondents and non-respondents to the discrimination item in variables included in the analyses (i.e., maternal age, generation status, parity, and years of education, occurrence of preterm birth, infant sex). Therefore, we decided to not impute missing values and applied complete cases analyses (Sidi and Harel, 2018).

Results

Sample characteristics

Table 1 provides an overview of the sample and group comparisons between Turkish immigrant and autochthonous women. Autochthonous women were similar in age to Turkish immigrant women but had significantly more years of education. In line with Hypothesis 1, there was a significant difference in risk of PTB between the Turkish-immigrant women (18.78%) and the autochthonous women (9.83%). Accordingly, length of gestation was significantly shorter and birth weight was significantly lower among infants of Turkish immigrant women. Further analyses adjusting for length of gestation indicated that lower birth weight among infants of Turkish immigrant women compared to autochthonous women was due to shorter length of gestation in Turkish immigrants. Sex distributions among newborns were approximately equal in both groups. Among Turkish immigrant women, those who reported having perceived discrimination (seldom or often) at the survey before birth had a significantly higher risk of PTB (35.42%) compared to those who reported to have never perceived discrimination (11.84%), $\chi^2(1, 109) = 8.18, p < .01, OR = 4.19$, which was in accordance with Hypothesis 2. Respectively, the gestational age was significantly lower, $t(87.68) = 3.29, p < .01, d = 0.65$, and the birth weight of their newborns significantly lower, $t(75.60) = 2.25, p < .05, d = 0.45$. Turkish immigrant women who reported perceived discrimination did not significantly differ from women who reported having never perceived discrimination in age, $t(100.6) = 1.70, p = .092, d = 0.33$, parity, $t(96.63) = -1.93, p = .057, d = 0.38$, years of education, $t(73.91) = 0.72, p = .472, d = 0.15$. 1st and 2nd generation Turkish immigrant women did not differ significantly in their PTB risk, $\chi^2(1, 211) = 0.17, p = .677, OR = 1.23$ or in their reports of perceived discrimination, $\chi^2(1, 111) = 1.74, p = .187, OR = 0.53$.

Turkish Immigrant Status and PTB

We proceeded to examine the relationship between Turkish immigrant status and PTB using logistic regression models (models M1 – M2; Table 2). In model M1 (unadjusted model), immigrant status was a significant predictor of PTB, confirming that Turkish immigrant women had a more than threefold increase in PTB risk compared to autochthonous women. This relationship remained significant and the magnitude of the effect did not change after adjusting for infant sex, maternal age, parity and years of education (model M2). All other covariates in model M2 were also significantly associated with PTB risk, indicating that the PTB risk was higher in women carrying a male fetus, in older women, in women with more children, and in women with fewer years of education. The proportion of explained variance as indicated by R^2 was, however, rather small in both models. Because of the large group size differences between the subsamples, we conducted a sensitivity analysis where models M1 and M2 were run with a random subsample of the German group with equal sample size to the Turkish group ($n = 217$). The results showed the same pattern of results and indicated a significantly higher risk for preterm birth for Turkish-origin immigrants (M1: $b = 1.20$, $SE = 0.32$, $p < .001$, $OR: 3.31$, 95% $CI[1.81-6.37]$; M2: $b = 1.29$, $SE = 0.38$, $p < .001$, $OR: 3.61$, 95% $CI[1.76-7.79]$).

Perceived Discrimination and PTB

The association between perceived discrimination and PTB (M3 – M4) was examined in the subsample of Turkish immigrant women and the results are depicted in Table 3. Perceived discrimination was a significant predictor of PTB in the unadjusted and the adjusted model. The control variables in the adjusted model M4 did not reach statistical significance. Women who reported having perceived discrimination before giving birth had an approximately fivefold higher risk of PTB than women who reported never having perceived discrimination. Perceived discrimination explained about 49% of the variance in PTB as suggested by R^2 .

Discussion

In summary, our analyses indicated that Turkish immigrant women (1st and 2nd generation) had a higher risk of PTB than German autochthonous women in the SOEP study sample (see Table 2). Furthermore, Turkish immigrant women who had reported incidents of perceived discrimination had a four times higher risk of PTB compared to Turkish immigrant women that did not report discrimination (see Table 3). These relationships remained significant and did not change in magnitude after adjusting for socioeconomic status. However, we acknowledge that immigrant status per se only accounted for a small amount of explained variance in PTB. In contrast, perceived discrimination explained around 50% of the variance in PTB in the subgroup of Turkish immigrant women, highlighting the potential clinical importance of this finding.

Our finding on the higher prevalence of PTB risk in Turkish immigrants is in line with two previously published studies. One study using data from the KIGGS study ($N = 17,641$ from throughout Germany, birth cohorts 1985–2006) suggested that the PTB risk was around 17.3% among women who originated from North Africa and the Middle East (incl. Turkey)

and thus significantly higher than in German women (Weichert et al., 2015). These PTB prevalences are comparable to the 18.78% that we observed in Turkish immigrants and 9.83% in German autochthonous women. A previous study also using the SOEP data up to 2011 ($N = 1,175$ from throughout Germany, birth cohorts 2002–2011) reported that 1st generation Turkish immigrant women had an around 3.5-fold increased PTB risk compared to German autochthonous women (Becker and Stolberg, 2013), which is again in line with our results, with an unadjusted OR for PTB in Turkish immigrant women of 3.26. On the other hand, our finding contradicts studies that indicated a lower or equal PTB risk for Turkish immigrant women. In the Berlin perinatal study ($N = 6,702$ from three maternity hospitals in Berlin, birth cohorts 2011–2012), 1st generation Turkish immigrants had a significantly lower PTB risk of only 3.5% when compared to German autochthonous women (9.0%) (David et al., 2017). This prevalence is much smaller than that found in our study and the study based on data from the KIGGS study. Finally, one study using a nationwide German perinatal database (BQS dataset, $N > 2.5$ M from throughout Germany, birth cohorts 2004–2007) indicated no differences in the PTB risk between immigrant women from North Africa and the Middle East (incl. Turkey) and German women (Reeske et al., 2011). This heterogeneity in the results of these studies might be due to methodological inconsistencies. Whereas in some studies Turkish immigrants were examined separately (Becker and Stolberg, 2013; David et al., 2017), they were grouped together with other immigrants from North Africa and the Middle East (Reeske et al., 2011; Weichert et al., 2015). Furthermore, 2nd generation Turkish immigrants were not studied at all or together with other 2nd generation immigrants (Becker and Stolberg, 2013; David et al., 2017; Reeske et al., 2011; Weichert et al., 2015). Finally, the datasets differ in their representativeness and comparability. For example, the studies included data from throughout Germany (Becker and Stolberg, 2013; Reeske et al., 2011; Weichert et al., 2015) as well as Berlin-only birth cohorts (David et al., 2017), and they included birth cohorts from different time periods.

The SOEP study provides a representative dataset with an oversampling of the immigrant population that allows for specific comparisons between Turkish immigrant women (both first and second generation) and native German women though the number of cases with data on birth outcomes is less comprehensive in the SOEP than in the other studies mentioned. Furthermore, while in other studies on PTB risk the focus has been merely on 1st generation Turkish immigrant women, we were also able to include 2nd generation immigrant women and test for the effect of generation status, which was not possible in the previous study on PTB in Turkish immigrants using SOEP data due to the small number of 2nd generation immigrants (Becker and Stolberg, 2013).

Our findings are in line with those of other studies reporting an association between increased PTB risk among African-American women and their perceptions and experiences of discrimination (Alhusen et al., 2016; Bower et al., 2018; Collins et al., 2004; Dole et al., 2004; Dominguez, 2008; Giscombé and Lobel, 2005; Giurgescu et al., 2011; Rosenberg, Lynn; Palmer, Julie R.; Wise, Lauren A.; Horton, Nicholas J.; Corwin, 2002). To our knowledge, we are the first to provide evidence that this relationship also exists among Turkish immigrant women in Germany. In prior studies, discrimination was only studied in relation to mental and physical health among immigrants in Germany (Igel et al., 2010; Schunck et al., 2015). The question arises as to how perceived discrimination becomes

biologically embedded and how it may initiate a cascade of biological processes that produce adverse birth outcomes. Discrimination is a stressful experience for the exposed individual and is evidently associated with psychological stress and stress-related health outcomes (Paradies, 2006; Paradies et al., 2015; Pascoe and Smart Richman, 2009; Williams et al., 1997; Williams and Mohammed, 2009). Stress triggers a biological response that involves the activation of the autonomic nervous system (which results in e.g., elevated blood pressure, increased heart rate), the endocrine system (e.g., secretion of stress-related hormones such as corticotropin-releasing hormone (CRH) and cortisol) and the immune system (e.g., increase in pro-inflammatory cytokines). During pregnancy, there are complex interactions between the maternal and fetal stress axes mediated by the placenta. Placental CRH (pCRH) has been revealed to play a key role in explaining the relationship between maternal psychosocial stress and PTB (Sandman, 2015; Sandman et al., 2006; Pathik D. Wadhwa WadhwaWadhwa et al., 2011; Wadhwa et al., 2004, 2001). The levels of pCRH rise during pregnancy as it is involved in the initiation of labor. The production of pCRH is stimulated by the release of maternal cortisol (Sandman, 2015). Thus, under conditions of maternal psychosocial stress during pregnancy, increased maternal cortisol concentrations can stimulate an earlier increase of pCRH levels (Ramos et al., 2019; Ruiz et al., 2015) that can in turn lead to an early onset of labor. Furthermore, CRH and cortisol influence the production of cytokines and modulate the inflammatory response to infection. It has been postulated that acute and chronic infections may be risk factors for uteroplacental vasculopathies, which in turn may be associated with premature birth (Romero et al., 2006).

In addition to and not independent of the above described stress-related biological pathways from perceived discrimination to PTB, other sequelae of perceived discrimination could contribute to the increased risk of PTB as well. These are, for example, restricted access to social and health resources, unhealthy behaviors (e.g., smoking, alcohol and drug use, unfavorable diet, and/or non-compliance with prenatal medical care visits due to fear of being discriminated against), which are well-described risk factors of PTB (Goldenberg et al., 2008; Pathik D. Wadhwa WadhwaWadhwa et al., 2011). To further investigate these assumptions, prospective birth cohort studies are needed where data on stress biology is collected longitudinally during pregnancy and after birth (for example, by measuring stress-related hormones and immune markers), as well as data on stress experience, perceived discrimination, health behavior (e.g., smoking, diet), and birth outcomes. This will allow researchers to investigate the potential mediating role of stress and stress biology in the relationship between perceived discrimination and PTB.

Limitations

Some limitations of the study should be noted. An important limitation of our analyses is that we were unable to control for other potential risk factors of PTB such as obstetric complications (e.g., hypertension, diabetes, vaginal bleeding), dietary intake and smoking (Goldenberg et al., 2008) because the data was either not assessed or only available in a small subsample. Gestational age at birth was based on mothers' self-report that might be biased by memory effects if they did not compare their statements with the medical record of the birth. The sample size of the subset of Turkish-origin women for which information on perceived discrimination was available was rather small ($n = 111$). Furthermore, the

measure of perceived discrimination captures the subjective attribution of an individual and is not an objective measure of structural discrimination or occurrences of racist assaults. However, given that an individual's perception of a situation as being stressful is the initiator of the stress response, we argue that perceived discrimination might be the starting point of the proposed sequelae of discrimination. Perceived discrimination or disadvantage is not just an issue for immigrants as it can also be aroused due to, for example, social origin, sexual orientation, and political attitudes. Future research should thus also investigate the potential link between perceived disadvantage and PTB among other minority groups.

We recognize that our study design does not permit any causal inferences regarding the role of processes related to immigration and discrimination in PTB. However, our hypotheses are based on conceptual and biological plausibility, and evidence from previously published studies. Our study contributes to the determination of the nature and strength of the association between the primary predictors (immigration, perceived discrimination) and the outcome of interest (PTB), after adjusting for effects of other established predictors of PTB, to provide evidence to support the underlying model. Thus, the current study represents an important first step towards transnational research in this context.

Conclusion

In conclusion, we found evidence that Turkish immigrant women have a higher risk of preterm birth compared to German autochthonous women, and that perceived discrimination is related to a higher risk of preterm birth among Turkish immigrant women in Germany. These findings are relevant contributions to the at present scarce research on the determinants of health disparities and to the research on the link between perceived discrimination and health in general. Further research based on prospective cohort studies is needed to investigate the interplay between perceived discrimination, stress experience, stress biology, and birth outcomes. Our study provides an important step towards developing targeted interventions to improve pregnancy and birth outcomes in at-risk groups.

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Table 1.

Characteristics of mothers and their newborns presented for German autochthonous and Turkish immigrant women ($N = 2525$).

Autochthonous women (<i>n</i> = 2308)			Turkish immigrant women (<i>n</i> = 217)		Group Comparison
<i>N</i>	Frequency	<i>M</i> (<i>SD</i>), range	<i>N</i>	frequency	
Maternal characteristics					
Age	2308	31.43 (5.44), 17–50	217	30.71 (5.68), 19–50	<i>t</i> (254.56) = 1.75, <i>p</i> = .082, <i>d</i> = 0.13
Years of education	2220	13.11 (2.9), 7–18	200	10.37 (2.21), 7–18	<i>t</i> (265.4) = 16.31, <i>p</i> < .001, <i>d</i> = 1.06
Parity	2306	2.02 (1.10), 1–9	216	2.29 (1.13), 1–6	<i>t</i> (254.6) = −3.39, <i>p</i> < .001, <i>d</i> = 0.24
1 st generation	-	-		133 (61.29%)	-
2 nd generation				84 (38.71%)	
PD: Often	-	-		9 (8.11%)	-
PD: Seldom				37 (33.33%)	
PD: Never				65 (58.56%)	
Newborn characteristics					
Birth weight (grams)	2298	3387.23 (556.29), 580–5870	216	3231.57 (562.81), 1030–4560	<i>t</i> (256.1) = 3.89, <i>p</i> < .001, <i>d</i> = 0.78
Gestational age	2275	39.35 (1.99), 26–48	211	38.25 (2.68), 25–42	<i>t</i> (231.82) = 5.79, <i>p</i> < .001, <i>d</i> = 0.47
Occurrence of PTB	2275	161 (7.08%)	211	42 (19.91%)	$\chi^2(1, 2486) = 40.68, p < .001, OR = 3.26$
Infant sex: female	2308	1162 (50.35%)	217	96 (44.24%)	$\chi^2(1, 2525) = 2.72, p = .099, OR = 1.28$

Note. PD = perceived discrimination; PTB = preterm birth

Table 2.

Logistic regression models with preterm birth as the criterion variable.

	M1 (unadjusted model)		M2 (adjusted model)	
	<i>b</i> (<i>SE</i>)	<i>OR</i> [95% <i>CI</i>]	<i>b</i> (<i>SE</i>)	<i>OR</i> [95% <i>CI</i>]
Immigrant status				
Autochthonous women (Reference)	Ref.		Ref.	
Turkish immigrant women	1.18 (0.19) ***	3.26 [2.22–4.71]	0.99 (0.22) ***	2.68 [1.74–4.07]
Infant sex				
Male (Reference)	-	-	Ref.	
Female	-	-	-0.34 (0.15) *	0.71 [0.53–0.96]
Maternal age	-	-	0.30 (0.09) ***	1.35 [1.14–1.60]
Parity	-	-	-0.22 (0.09) *	0.80 [0.67–0.95]
Years of education	-	-	-0.27 (0.09) **	0.76 [0.64–0.91]
<i>Model information</i>				
Constant	-2.58 (0.08)		-2.44 (0.11)	
Cases	2486		2380	
<i>R</i> ²	0.02		0.08	

Note.

 $p < .001$,**
 $p < .01$,*
 $p < .05$.Analyses involved the whole sample (i.e., $n = 217$ Turkish immigrant and $n = 2308$ autochthonous women).

Table 3.

Logistic regression models with preterm birth as the criterion variable.

	M3 (unadjusted model)		M4 (adjusted model)	
	<i>b</i> (SE)	OR [CI]	<i>b</i> (SE)	OR [CI]
Perceived discrimination				
Never (Reference)	Ref.		Ref.	
Seldom / often	1.45 (0.49) ***	4.25 [1.68–11.56]	1.75 (0.58) **	5.76 [1.95–19.38]
Generation status				
1st generation (Reference)	-	-	Ref.	
2nd generation	-	-	0.79 (0.63)	2.20 [0.64–7.93]
Infant sex				
Male (Reference)	-	-	Ref.	
Female	-	-	0.71 (0.53)	2.03 [0.73–5.90]
Maternal age	-	-	<0.01 (0.34)	1.00 [0.51–1.93]
Parity	-	-	-0.36 (0.35)	0.70 [0.34–1.36]
Years of education	-	-	-0.11 (0.33)	0.90 [0.46–1.73]
Model information				
Constant	-1.19 (0.38)		-2.68 (0.62)	
Cases	109		99	
<i>R</i> ²	0.49		0.56	

Note.

 $p < .001$,**
 $p < .01$,*
 $p < .05$.Analyses involved only the subsample of $n = 111$ Turkish immigrant women.