



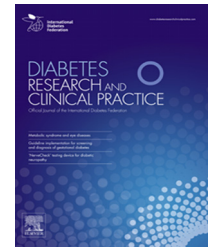
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## Association between social capital and the prevalence of gestational diabetes mellitus: An interim report of the Japan Environment and Children's Study



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### ABSTRACT

**Background:** Social capital is generally defined as the quality and frequency of social interactions with relatives, neighbors, and society. Social capital refers to broad concepts of social interactions and structures in individuals, communities and societies such as trust (e.g., neighborhood trust, which is social cohesion with neighbors) and social support (e.g., emotional support, which is the level of the feeling of being loved). Studies during the last few decades have shown that there is a significant inverse association between social capital and the prevalences of diseases such as depression and acute coronary syndrome. Significant inverse associations between trust, social support and the prevalence of

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diabetes have also been shown. However, associations between social capital and the prevalence of gestational diabetes mellitus (GDM) are less clear.

**Methods:** We used the primary dataset of the Japan Environment and Children's Study (JECS), including 10,228 mothers with recorded obstetric outcomes from January to December 2011. In this study, we included 8874 the 10,228 participants. Diagnosis of GDM was determined using the criteria of the Japan Diabetes Society (JDS). The quality and quantity of social capital were measured with nine questions on a self-administered questionnaire during the second or third trimester. Using principal component analysis (PCA), we distinguished the following three components (indices) of social capital: (A) index of all nine questions about social capital, (B) index of emotional support and neighborhood trust and (C) index of generalized trust. The high factor loading variants of indices were as follows; (A) all nine variants, (B) five variants about emotional support and neighborhood trust and (C) two variants about generalized trust. Multivariate random effect modeling was used to calculate the odd ratios (ORs) for evaluating the association between these indices of social capital and the prevalence of GDM. This model was adjusted for baseline characteristics such as family income, BMI before pregnancy and smoking during pregnancy.

**Results:** Of the 8874 participants, 204 women developed GDM (2.30%). Multivariable logistic regression analysis showed that index B, the index of emotional support and neighborhood trust (adjusted OR: 0.651, 95% CI: 0.429, 0.987) was significantly and independently associated with the prevalence of GDM.

**Conclusions:** We found that the 5-question index of emotional support and neighborhood trust is significantly associated with the prevalence of GDM during pregnancy.

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## 1. Introduction

Gestational Diabetes Mellitus (GDM) is defined as hyperglycemia with carbohydrate intolerance that is first recognized during pregnancy [1]. In Japan, screening and diagnosis of GDM is performed using the criteria of the Japanese Society of Diabetes (JDS) published in 2010 [2,3]. The incidence rate of GDM using these JDS criteria ranges from 7% to 13% [4,5]. As in type 2 diabetes mellitus, patients with GDM present with both insulin resistance [6] and hyperglycemia [7]. Moreover, GDM can cause major maternal, fetal and neonatal complications. Maternal complications include higher rates of shoulder dystocia, cesarean section, and pregnancy-induced hypertension (PIH) [2] as well as a higher risk of future development of type 2 diabetes [8]. Complications for the fetus and neonate include large for gestational age (LGA) [9], fetal growth restriction (FGR) [10], miscarriage, stillbirth, respiratory complications [11], neonatal hypoglycemia and neonatal hyperbilirubinemia [2]. Moreover, GDM not only affects outcomes during pregnancy but also increases the newborn's risks of obesity in childhood [12] and type 2 diabetes in adulthood [13]. In previous studies, several factors have been reported to be associated with the prevalence of GDM, including older maternal age, body mass index (BMI) before pregnancy, ethnicity [11], first-degree family history of diabetes, and current glycosuria as well as histories of GDM or glucose intolerance, a previous infant with macrosomia [1], high parity, smoking during pregnancy, and certain genetic factors [14]. Nevertheless, the precise mechanisms underlying GDM are currently unknown. Because various genetic [15,16] and environmental [11,17,18] factors contribute to the pathology of the disease, it is important to find

additional associated factors that could unravel the complex interactions.

Social capital is generally defined as the quality and frequency of one's social interactions with relatives, neighbors, and society [19]. Some researchers have defined social capital as trust or the rule of reciprocity within social networks, promoting cooperative relationships among individuals [20]. On the other hand, some regard social capital as a characteristic of the structure of a society shaping, the actions of individuals within it and based on bonds of trust, clear information channels, and divertible social systems [21,22]. One exemplary form of social capital takes a layer structure which consists of individual, community and macro level concepts [23,24]. As an example of this structure, trust consists of interpersonal trust, neighborhood trust and generalized trust. Interpersonal trust is individual-level trust, consisting of perceived fairness, trust and mutual aid [23,25]. Neighborhood trust is community-level trust, which is a level of respect for the neighborhood and social cohesion [23,25]. Generalized trust is a macro-level trust which is defined as a "default" belief in the benign nature of humans in general [24]. Another form of social capital takes a network structure from individuals. As an example of this structure, social support consists of social network and functional support. As social network is a unit of social structure composed of the individual's social ties with others and their ties among themselves [26]. Functional support is defined as subjective satisfaction with available support provided. Functional support is often classed into six sub-concepts; instrumental support (e.g., help getting tangible tasks done), financial support (economic support), informational support (guidance or feedback that can provide a solution to a problem), appraisal support (help evaluating a

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