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Short communication

Cumulative receipt of an anti-poverty tax credit for families did not impact tobacco smoking among parents

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ABSTRACT

The effect of anti-poverty tax credit interventions on tobacco consumption is unclear. Previous studies have estimated short-term effects, did not isolate the effects of cumulative dose of tax credits, produced conflicting results, and used methods with limited control for some time-varying confounders (e.g., those affected by prior treatment) and treatment regimen (i.e., study participants' tax credit receipt pattern over time). We estimated the longer-term, cumulative effect of New Zealand's Family Tax Credit (FTC) on tobacco consumption, using a natural experiment (administrative errors leading to exogenous variation in FTC receipt) and methods specifically for controlling confounding, reverse causation, and treatment regimen. We extracted seven waves (2002–2009) of the nationally representative Survey of Family, Income and Employment including 4404 working-age (18–65 years) parents in families. The exposure was the total numbers of years of receiving FTC. The outcomes were regular smoking and the average daily number of cigarettes usually smoked at wave 7. We estimated average treatment effects using inverse probability of treatment weighting and marginal structural modelling. Each additional year of receiving FTC affected neither the odds of regular tobacco smoking among all parents (odds ratio 1.02, 95% confidence interval 0.94–1.11), nor the number of cigarettes smoked among parents who smoked regularly (rate ratio 1.01, 95% confidence interval 0.99–1.03). We found no evidence for an association between the cumulative number of years of receiving an anti-poverty tax credit and tobacco smoking or consumption among parents. The assumptions of marginal structural modelling are quite demanding, and we therefore cannot rule out residual confounding. Nonetheless, our results suggest that tax credit programme participation will not increase tobacco consumption among poor parents, at least in this high-income country.

1. Introduction

National governments and international organisations increasingly use financial credits as social protection interventions for alleviating poverty (Garcia and Moore, 2012; Fizbein and Schady, 2009). These anti-poverty financial credits might theoretically reduce tobacco consumption by reducing the psychological distress associated with financial insecurity (Pega et al., 2013; Pega et al., 2015a). Alternatively, raising poor people's incomes might also facilitate higher tobacco consumption by enhancing their ability to purchase more tobacco or attenuating demand-lowering impacts of tobacco taxes (Blakely et al., 2014; Pega et al., 2013; Pega et al., 2015a).

Six previous studies have empirically investigated the relationship between anti-poverty tax credits and tobacco use (Table 1 for review) (Averett and Wang, 2013; Hamad and Rehkopf, 2015; Kenkel et al., 2011; Pega, 2013; Rehkopf et al., 2014; Strully et al., 2010). All studies (except one [Pega, 2013]) estimated short-term effects of the United States (US) Earned Income Tax Credit (EITC) on smoking prevalence without considering tobacco consumption per smoker and without isolating the effects of cumulative tax credit receipt. Three studies found reductions in smoking prevalence (Averett and Wang, 2013; Rehkopf et al., 2014; Strully et al., 2010), two found no change (Hamad and Rehkopf, 2015; Pega, 2013), and one found an increase (Kenkel et al., 2011). Their methods had limited control for time-varying confounders

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Table 1
Previous studies of the effect of tax credits on tobacco smoking.

Study	Country	Method	Exposure	Outcome	Participants	Effect estimate (95% confidence interval)
Strully et al., 2010	US	Difference-in-differences regression	Lived in a state with Earned Income Tax Credit (EITC)	Smoked during pregnancy	Mothers	odds ratio (OR) 0.95 (0.94–0.96)
Kenkel et al., 2011	US	Instrumental variable analysis	Elasticity of income from EITC	Smoked	Mothers and fathers	−0.08 ($p < 0.01$)
				Stopped smoking		0.05 ($p < 0.01$)
Averett and Wang, 2013	US	Difference-in-differences regression	Was eligible for EITC	Smoked	Black mothers	mean difference (MD) −0.11 (0.01–0.21)
					White mothers	MD −0.04 (−0.14– 0.05)
Pega, 2013	New Zealand	Individual-fixed effects regression	Became eligible for Family Tax Credit	Smoked	Mothers and fathers	OR 0.92 (0.63–1.34)
			Became eligible for an additional amount of NZ$1000 of Family Tax Credit			OR 1.02 (0.95–1.09)
			Became eligible for In-Work Tax Credit			OR 0.91 (0.65–1.23)
			Became eligible for an additional amount of NZ$1000 of In-Work Tax Credit			OR 0.98 (0.87–1.11)
Rehkopf et al., 2014	US	Difference-in-differences regression	Was eligible for EITC	Smoked	Mothers	OR 0.98 (0.97–0.99)
					Fathers	OR 1.00 (0.99–1.01)
Hamad and Rehkopf, 2015	US	Difference-in-differences regression	Was eligible for an additional amount of US$1000 of EITC	Smoked during pregnancy	Mothers	MD 0.01 (−0.03– 0.06)

(including those affected by prior treatment [Robins et al., 2000]) and treatment regimen (i.e., each participant's specific pattern of FTC receipt over time) (Supplementary Appendix 1 for detailed discussion) (Pega et al., 2013).

The tobacco use epidemics in New Zealand and the US are perhaps comparable. Both countries have reported steady reductions in the percentage of the adult population who report being current smokers to 18% in 2012/13 in New Zealand and 15% in 2015 in the US, respectively (Centers for Disease Control and Prevention, 2016; Ministry of Health, 2014). In both countries, people living in income poverty or neighbourhood-level deprivation remain to be at considerably higher risk of smoking, compared with those not living in poverty or deprivation (i.e., 32% versus 13% in 2012/13 in New Zealand and 26% versus 14% in 2015 in the US, respectively) (Centers for Disease Control and Prevention, 2016; Ministry of Health, 2014).

The Family Tax Credit (FTC) is the New Zealand Government's main anti-poverty tax credit for families (Inland Revenue Department, 2012 for eligibility criteria). The maximum amount of FTC for a family with two dependent children in 2007 was $7252 (approximately 20% of per-capita gross national income) (Inland Revenue Department, 2007). New Zealand's FTC policy and the US' EITC both aim to reduce poverty and target low-income families, but the FTC is unconditional (provided without any obligation) whereas the EITC is employment-conditional (provided only to those who earn income from employment), and the FTC is relatively more generous than is the EITC (Pega, 2013). Due to administrative errors, the FTC was overpaid (Hume and Woulfe, 2008) to some families and underpaid to others (Inland Revenue Department and Ministry of Social Development, 2007; Morton et al., 2010), resulting in a natural experiment that can be analysed using "causal inferential" epidemiological methods (Pega et al., 2016). Our previous research found that neither eligibility for FTC, nor income increases through the FTC were associated with any changes in smoking status (Pega, 2013) (Table 1 for estimates) and self-rated health (Pega et al., 2014) over the short term, but each additional year of receiving the FTC modestly decreased self-rated health among working-age parents (Pega et al., 2016).

In the present study, we estimated the longer-term effect of receiving FTC on tobacco consumption among parents in a national longitudinal cohort, analysing the natural experiment described above using "causal inferential" epidemiological methods. We sought to answer the following two research questions: *What is the effect of each additional year of receiving FTC (over a seven-year period) on regular smoking among parents?* and *What is the effect of each additional year of receiving FTC on the number of cigarettes usually smoked per day among parents who smoked regularly?*

2. Methods

2.1. Study design

We extracted seven waves of data (waves 1–7, 2002–2009) from the Survey of Family, Income and Employment (SoFIE, data version V.2) conducted between October 2002 and September 2010 by Statistics New Zealand (Carter et al., 2010). The SoFIE collected a representative sample of the New Zealand resident population in non-institutionalised households, interviewing 29,790 persons (>22,000 adults) in 11,500 households at baseline (Carter et al., 2010). These original sample members were followed up annually over the study period (Carter et al., 2010 for full cohort profile). To capture the FTC target and recipient population, we restricted the survey sample to a balanced panel of 4404 working-age (19–65 years) parents (Fig. 1 for flow-chart). We also conducted subgroup analyses on the 852 parents (19.3%) who smoked regularly (ie, smoked at all waves collecting smoking data: waves 3, 5, and 7).