Short Communication

Perceived family relationship quality and use of poly-tobacco products during early and late adolescence

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HIGHLIGHTS

- Data from a large, population-based sample of 42,250 adolescents were analysed
- Poor perceived family relationship predicts adolescent use of poly-tobacco products
- The associations were stronger for alternative tobacco than cigarettes
- The associations were stronger in early than late adolescents

ABSTRACT

Background: The role of family relationship in adolescent use of emerging tobacco products, which have become increasingly popular, is unknown. We examined the associations of perceived family relationship quality with current use of poly-tobacco products including cigarettes, electronic cigarettes (e-cigarettes), waterpipe and smokeless tobacco in adolescents.
Methods: Data from a representative sample of 42,250 US grade 7–12 equivalent students (mean ± SD age 14.6 ± 1.9 years; 51.3% boys) from 75 randomly selected secondary schools in Hong Kong (2012−13) were analysed. Logistic regressions yielded adjusted odds ratios (AORs) for current (past 30-day) use of cigarettes, e-cigarettes, waterpipe, smokeless tobacco and poly-tobacco (≥2 products) in relation to perceived family relationship quality, adjusted for age, sex, perceived family affluence, parental education, family structure, parental and sibling smoking and secondhand smoke exposure at home. Subgroup analyses were conducted to compare the associations in early (aged ≤14 years) versus late (> 14) adolescents.
Results: The odds of current use increased with worse perceived family relationship quality with AORs (95% confidence interval) of up to 2.92 (2.32–3.68) for cigarettes, 7.28 (4.71–11.2) for e-cigarettes, 5.04 (3.44–7.40) for waterpipe, 8.09 (4.87–13.4) for smokeless tobacco and 5.25 (3.45–8.01) for poly-tobacco products use (all P for trend < .001). The associations for all tobacco use outcomes were stronger in early than late adolescents (all P for interaction < .001).
Conclusions: Dose-response relationships were found between negatively perceived family relationship quality and current poly- and individual tobacco product use by Hong Kong Chinese secondary students. The associations were stronger for alternative tobacco products and in early adolescents.

1. Introduction

Family dysfunction jeopardises adolescent health and development and predisposes them to health-risking behaviours, which may have lasting health consequences across the lifespan (Felitti et al., 1998; Resnick et al., 1997). Adolescents exposed to family conflict have higher risk of psychological distress (Lucas-Thompson & Goldberg, 2011; Sheeber, Hops, Alpert, Davis, & Andrews, 1997), which predicts later initiation of tobacco use (T. H. Lam et al., 2005; Leventhal et al., 2017). Functional neuroimaging research has also found negative family relationship quality hampers cognitive control (McCormick, Qu, & Telzer, 2016), rendering adolescents vulnerable to risky behaviours like substance misuse (Casey & Jones, 2010; Geier, 2013). Numerous studies have linked negative family relationship quality to cigarette smoking in

adolescents across different cultures (Mahabee-Gittens, Xiao, Gordon, & Khoury, 2012; Nelson et al., 2016; Rajesh, Diamond, Spitz, & Wilkinson, 2015; Shakib et al., 2005). However, it is unknown whether this association extends to emerging alternative tobacco products such as electronic cigarettes (e-cigarettes) and waterpipe, which have become more popular than conventional cigarettes among adolescents (Gilreath et al., 2016). Recognizing risk factors for alternative tobacco use is imperative to guide preventive measures.

In general, the influence of family on adolescents changes as they grow older (Smetana, Campione-Barr, & Metzger, 2006). Perceived family relationship quality was found to be more strongly associated with depressive symptoms, a risk factor for smoking, in early adolescents than late adolescents (Greenberger & Chen, 1996). However, very little is known about whether the effect of family relationship quality on adolescent tobacco use differs by stage of adolescence.

Hong Kong is the most westernized city of China with remarkably successful tobacco control measures and the lowest prevalence of daily smoking in the developed world (10.0% in 2017) (Census and Statistics Department, 2018). However, current use of e-cigarette and waterpipe were more prevalent among adolescent than adults (Jiang, Ho, Wang, Leung, & Lam, 2016; Jiang, Wang, Ho, Leung, & Lam, 2016). Research on poly-tobacco use among youths was reported exclusively in western populations. Using the first data on poly-tobacco products use in a large, population-representative sample of Chinese secondary school students in Hong Kong, we examined whether dose-response relationships existed between perceived family relationship quality and current use of cigarette, e-cigarette, waterpipe, smokeless tobacco and poly-tobacco products. We also examined whether these associations vary by stage of adolescence.

2. Material and methods

2.1. Study design

The School-based Survey on Smoking among Students (2012/13), a biennial survey, was commissioned by the Food and Health Bureau of the Hong Kong government to monitor smoking prevalence in students. Detailed methods were reported previously (Jiang, Wang, et al., 2016). Briefly, a representative sample of 75 secondary schools was selected from all 18 districts in Hong Kong using a stratified proportionate random sampling strategy. After obtaining passive consents from parents, students were invited to voluntarily complete an anonymous, 96-item, paper-and-pencil questionnaire in Chinese. A total of 45,857 secondary 1 to 6 (equivalent to US grade 7 to 12) students (96% of all invited) responded. Ethical approval was granted by the Institutional Review Board of the University of Hong Kong/Hospital Authority Hong Kong West Cluster.

2.2. Measures

2.2.1. Exposure measures

This study used a brief, 3-item perceived family relationship quality scale developed based on our findings from 2 qualitative studies on family relationship in Hong Kong Chinese (Chan et al., 2011; W. W. Lam et al., 2012). The students rated: (1) interparental relationship (what do you think is the relationship between your father and mother?) and (2) family harmony (how well your family gets along?), each recoded as 0 for "very good/good" or 1 for "fair/ bad/ very bad", and (3) family happiness (all things considered, you think your family is…) with responses recoded as 0 for "very happy/ happy" and 1 for "not very happy/ not happy at all". These 3 items have satisfactory internal consistency (Cronbach's α = 0.70) and 8-day test-retest reliability (intraclass correlation coefficient s = 0.67 to 0.85), and strongly predict intention to smoke in Chinese never-smoking youths in Hong Kong (Luk et al., 2017). The sum of these 3 items formed the perceived family relationship quality score ranging from 0 (reference) to 3, with higher scores indicating worse perceived family relationship.

2.2.2. Outcome measures

Questions were adapted from the Global Youth Tobacco Survey (GYTS) to assess cigarette smoking behaviour (P. Chen, Chiou, & Chen, 2008). Students who reported occasional/ daily cigarette smoking and smoked cigarette(s) in the past 30 days were regarded as current cigarette smokers. Current (past 30-day) use of alternative tobacco products, including e-cigarettes, waterpipe (or hookah) and smokeless tobacco (e.g. chewing tobacco and snus), were also reported. Poly-tobacco products use was defined as concurrent use of > 1 type of these tobacco products (Gilreath et al., 2016).

2.2.3. Potential confounders

As household smoking and secondhand smoke exposure at home may contribute to both negatively perceived family relationship quality (J. Chen, Ho, Au, Wang, & Lam, 2015) and tobacco use in youths (Wang, Ho, & Lam, 2011), we collected data on parental smoking (recoded as none, either or both), sibling smoking (no/ yes) and number of days exposed to secondhand smoke at home in the past week (0–7). Information on other potential confounders, including age, sex, perceived family affluence (rich/ average/ poor), parental education levels (primary or below/ secondary/ tertiary/ don't know) and family structure (intact/ single parent/ no-parent) (Wellman et al., 2016), were also recorded. Perceived family affluence is a reliable measure of family socioeconomic status in Hong Kong adolescents (Ho et al., 2010). Peer smoking was not considered a confounder because it may lead to tobacco use but not negative family relationship quality.

2.3. Statistical analysis

All analyses were conducted in Stata/IC 13.1 with svy commands to account for the school clustering effect. Data were weighted by age, sex, and grade distributions of the Hong Kong official secondary student enrolment statistics in 2012/13. After excluding students reporting "not applicable" for interparental relationship ($n = 2453$) and those with missing data in any question assessing perceived family relationship quality ($n = 1362$), a final weighted sample of 42,250 students was analysed. Students with or without missing data in perceived family relationship quality were similar in age, sex and grade (effect sizes = 0.02 to 0.06).

The associations of sociodemographic characteristics with family relationship quality score were analysed using one-way analysis of variance for continuous variables and chi-square test for categorical variables. Logistic regression was used to compute adjusted odds ratio (AOR) for each tobacco product and poly-tobacco use in relation to perceived family relationship quality analysed as a categorical variable (0 [reference] to 3), adjusting for all potential confounders. To examine dose-response relations, perceived family relationship quality was also analysed as a continuous variable to compute P value for linear trend (P for trend). Subgroup analyses were conducted by the stage of adolescence: early (age ≤ 14 years, $n = 19,605$) and late (age > 14 years, $n = 22,646$) (Irwin & Burg, 2002). A multiplicative interaction term of perceived family relationship quality × stage of adolescence (early vs late) was included in the regression models with adjusted Wald test used to calculate an omnibus P value for interaction for each tobacco use outcome. Complete case analyses were conducted as missing values were minimal (< 1%). A 2-sided $P < .05$ denotes statistical significance.

3. Results

The mean (SD) age of students was 14.6 (1.9) years and 51.3% were boys. More negatively perceived family relationship quality was associated with older age, male sex, perceived poorer family affluence, lower parental education, non-intact family structure, parental