Brief Report

Maternal current smoking: Concordance between adolescent proxy and mother's self-report

Vandita Vasudevan, Carol J. Etzel, Margaret R. Spitz, & Anna V. Wilkinson

Abstract

Introduction: The purpose of this study was to examine the extent to which adolescent reports on mother's smoking status and mother's self-reports on smoking are concordant with one another.

Methods: Mothers self-reported on their smoking at two time-points (first query and second query), while the adolescents reported on their mother's smoking status at one timepoint. Kappa values and percent exact agreement as well as sensitivity and specificity were calculated to examine the degree of agreement between child and mother's reports at the two timepoints.

Results: Overall, the results indicated good concordance between mothers' self-reports and adolescent reports on smoking. Specifically, higher concordance was observed for mother's first query compared with mother's second query ($\kappa = 0.69$ vs. $\kappa = 0.51$). Younger adolescents and girls provided more concordant reports than older adolescents and boys.

Discussion: The results indicate that adolescent reports on mothers' smoking behavior can be used as a proxy to obtain data if mothers' self-report data are not available. Our results further suggest that when reports are not collected concurrently, self-report data obtained from the mothers prior to the proxy report obtained from her adolescent may be more reliable than the other way around.

Introduction

Adolescent proxy reports on parental smoking are a widely used measurement strategy to examine the prevalence of smoking among parents (Brook, Pahl, & Ning, 2006; Otten, Engels, van de Ven, & Bricker, 2007); yet, very few studies have examined the concordance between parent and child reports

on smoking. Pomerleau et al. (2005) examined the reliability of reports on parental smoking by adult children, while Wong et al. (2004) validated the agreement between parental and child reports (age 7–14 years) among smokers by measuring environmental tobacco smoke. To our knowledge, only one study, based on a low income inner-city Canadian population (Barnett, O'Loughlin, Paradis, & Renaud, 1997), has examined reliability between child (age 9–13 years) and parent reports. This study demonstrated a 93.1% agreement rate among student–mother pairs and 86.4% agreement rate among student–father pairs.

People of Mexican origin represent the largest and most rapidly growing minority group in the United States (U.S. Census Bureau, 2005). We have found that maternal smoking places mothers' adolescents at increased risk for smoking among a U.S.-based predominantly low income inner-city Mexican-origin population (Wilkinson et al., 2008). Thus, the main aim of this study was to examine concordance between adolescents' proxy reports and mothers' self-reports on mothers' smoking.

Methods

The mothers included in this analysis were participants in a population-based prospective cohort of Mexican-American households ongoing in the Department of Epidemiology at the University of Texas M.D. Anderson Cancer Center since July 2001. Henceforth, this cohort study will be referred to as the Mexican-American Cohort Study (MACS). The adolescent participants ($N = 1,328$) are part of a prospective subcohort (nested within MACS) examining genetic and nongenetic factors associated with smoking initiation among Mexican-origin youth between 11 and 13 years of age at baseline. This nested cohort study will be referred to as the Mexican-American Tobacco Use in Children (MATCH) study. Detailed descriptions of the recruitment methodology for MACS (Wilkinson et al., 2005) and MATCH (Wilkinson et al., 2008) have been published.

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Table 1. Agreement between child and mother's self-reports and mother-mother self-reports on mother's current smoking

	Child-mother pairs		
	Mother's first query (<i>n</i> = 1,213)	Mother's second query (<i>n</i> = 1,105)	Mother-mother pairs (<i>n</i> = 1,029)
Current smoking prevalence, % (95% <i>CI</i>)			
Child reports	7.8 (6.4–9.4)	7.0 (5.5–8.5)	
Parent reports	6.7 (5.3–8.2)	5.5 (4.2–6.9)	
Exact agreement, % (95% <i>CI</i>)	95.96 (94.65–96.97)	94.21 (92.62–95.48)	95.53 (94.03–96.67)
Kappa (95% <i>CI</i>)	0.69 (0.60–0.77)	0.51 (0.40–0.61)	0.56 (0.44–0.67)
Sensitivity	76.62	60.66	62.75
Specificity	97.27	96.16	97.24

Proxy reports were obtained at MATCH baseline home interviews on mothers' smoking status. Mothers' smoking status was assessed with the question "Does your mother/stepmother smoke?" Positive responses ("Yes") from the adolescent were categorized as "current smoker" and compared with negative responses ("No"). Mothers self-reported their smoking status at two timepoints. The mothers (*n* = 1,213) had previously provided data (median time 1 year previously; *M* = 1.03 years; *SD* = 1.17) when they were enrolled into the cohort (Query 1). Smoking behavior among mothers was assessed with the question "Have you smoked at least 100 cigarettes (five packs) in your lifetime?" Mothers who responded "Yes, currently smoke" were categorized as current smokers and were compared with never-smokers and quitters. About a year and a half after the adolescent had enrolled in MATCH and had completed his/her baseline interview, mothers (*n* = 1,113) answered the same question via phone (*M* = 1.38 years; *SD* = 0.47). A total of 1,029 (84.8% overlap or 93.1% overlap) mothers provided data at both timepoints.

Mothers and adolescents in each group for whom proxy reports or mothers' self-reports on smoking were not available were excluded from the analysis (*n* = 115 for first query and *n* = 223 for second query). Eight adolescents who did not live with their mothers were also excluded from this analysis.

Statistical analysis

We calculated estimates of smoking prevalence and 95% *CI*s among the mothers for Queries 1 and 2. We also calculated sensitivity and specificity for Queries 1 and 2. In addition, overall and stratified (gender, age, birthplace, and the adolescents' smoking status) kappa values and percent exact agreement were calculated. Finally, we completed logistic regression analyses to examine factors associated with disagreement on mother's smoking behavior. In the first analysis, we compared mother-adolescent pairs who were discordant (*n* = 49) with mother-adolescent pairs who were concordant (*n* = 59) on mothers' current smoking. In the second analysis, we compared concordant and discordant pairs for non-smoking (*n* = 1,105).

Results

Table 1 presents overall agreement rates between adolescent proxy reports and mother's self-reports on smoking. Overall, the results indicated higher levels of agreement and kappa

values between the mothers' and the proxy reports at the first query compared with the second query (95.96 vs. 94.21), indicating greater concordance between mother's self-reports and proxy reports at the first query compared with the second query ($\kappa = 0.69$ vs. $\kappa = 0.51$). Regardless of the query, adolescents reported higher smoking prevalence among their mothers (6.7% vs. 7.8% at first query and 5.5% vs. 7.0% at second query) than did their mothers. The concordance between mother's first query and second query was 95.53% ($\kappa = 0.56$).

Table 2 presents bivariate analysis stratified by the adolescent's demographic characteristics and smoking status. The kappa statistic indicated that regardless of query, mother-daughter pairs reported higher rates of agreement compared with mother-son pairs. Regardless of query, younger adolescents' (11-year-olds) reports agreed with their mothers' reports more than their older peers, as did the reports from adolescents born in the United States compared with those born in Mexico. In addition, adolescents who had experimented with smoking reported lower rates of agreement compared with the other groups.

Table 3 presents the results of the logistic regression analysis examining factors associated with disagreement. Since the kappa values in general were better from the first query, logistic regression was conducted using data from first query only. The results of the first logistic regression did not identify any significant risk factors. However, the results from the second logistic regression analysis revealed that 13-year-olds were 2.67 times (*CI* = 1.22–5.92) more likely to disagree with their mothers compared with 11-year-olds, and experimenters were 2.68 times (*CI* = 1.23–5.82) more likely to disagree compared with nonexperimenters.

Discussion

This is one of the few studies examining concordance between adolescent proxy reports and mothers' self-reported smoking status. Similar to Barnett et al. (1997), we found good concordance between mothers' self-reports and adolescent proxy reports on smoking, although adolescents reported a higher prevalence of smoking among their mothers than the mothers self-reported. Based on the first query, we observed a 96% agreement rate among adolescent-mother pairs and a 94% agreement rate at the second query. In addition, concordance was higher between adolescent reports and mothers' first query than

Table 2. Univariate analysis of potential correlates of agreement between child and mother's self-reports on mother's current smoking

Characteristics	<i>n</i>	κ	95% <i>CI</i>	% Agreement	95% <i>CI</i>
Mother's first query (<i>n</i> = 1,213)					
Gender					
Male	596	0.66	0.55–0.78	95.1	93.0–96.7
Female	617	0.71	0.59–0.83	96.8	95.0–98.0
Age (years)					
11	486	0.77	0.63–0.91	97.9	96.1–99.0
12	390	0.67	0.52–0.82	95.6	93.0–97.4
13	337	0.63	0.49–0.77	93.5	90.1–95.8
Birthplace					
Mexico	326	0.63	0.45–0.81	95.7	92.7–97.5
United States	879	0.70	0.61–0.80	96.0	94.5–97.2
Smoking status					
Not susceptible	859	0.69	0.58–0.80	97.1	95.7–98.1
Susceptible	239	0.72	0.58–0.87	94.6	90.7–97.0
Experimented	115	0.57	0.35–0.80	90.4	83.2–94.9
Mother's second query (<i>n</i> = 1,105)					
Gender					
Male	553	0.48	0.33–0.62	93.1	90.6–95.0
Female	552	0.54	0.39–0.70	95.3	93.1–96.8
Age (years)					
11	436	0.55	0.34–0.76	96.8	94.5–98.2
12	359	0.50	0.32–0.69	94.2	91.1–96.3
13	310	0.47	0.31–0.64	90.7	86.7–93.5
Birthplace					
Mexico	283	0.35	0.13–0.58	93.3	89.5–95.8
United States	822	0.55	0.44–0.67	94.5	92.7–95.9
Smoking status					
Not susceptible	781	0.48	0.33–0.62	95.4	93.6–96.7
Susceptible	212	0.63	0.45–0.82	93.9	89.5–96.6
Experimented	112	0.38	0.12–0.64	86.6	78.6–92.1

mothers' second query. The concordance between the mothers' first query and second query was also good, indicating good consistency in mother reports on smoking.

Table 3. Factors associated with disagreement of smoking by adolescents (*n* = 1,154)

Characteristics	Odds ratio	95% <i>CI</i>
Gender		
Female	1.00	
Male	1.38	0.76–2.50
Age (years)		
11	1.00	
12	2.02	0.91–4.51
13	2.67	1.22–5.92
Birthplace		
United States	1.00	
Mexico	1.07	0.56–2.03
Smoking status		
Not susceptible	1.00	
Susceptible	1.73	0.86–3.49
Experimentation	2.68	1.23–5.82

Although concordance between mothers' first query and second query was good, one factor that could contribute to the discordant responses between the mothers and their children is the fact that some of the mothers' smoking status changed between two queries. Therefore, the accuracy of the child's report could depend on when the children provided data in relation to when their mothers provided data. Overall, 4.5% (46 women) reported a change in smoking status between the two queries; 19 women reported that they started smoking and 27 women reported that they quit smoking, suggesting that this impact was limited.

To be consistent with previous research (Barnett et al., 1997), we compared reports of current smoking with reports of never and quitting. However, when we compared reports of current with reports of never smoking only, the kappa values at the second query increased, $\kappa = 0.62$ (95% *CI* = 0.51–0.72), as did the κ value based on mother–mother reports, $\kappa = 0.70$ (95% *CI* = 0.59–0.80; data not shown).

We identified two factors associated with discordant smoking reports. In contrast to Barnett et al. (1997), we found that younger adolescents, not older ones, were more likely to provide concordant responses with their mothers. However, the adolescents in Barnett et al. ranged in age from 9 to 13 years, compared with 11–13 years in our study. A closer inspection of

concordance rates observed by Barnett et al. reveals that, consistent with our results, 11-year-olds had the highest concordance rates.

We also found that experimenters were more likely to misclassify their mothers' smoking status than nonexperimenters. Of those adolescents who disagreed, 63.3% misclassified their mothers as smokers. Because maternal smoking places mothers' adolescent children at increased risk of smoking (Wilkinson et al., 2008), it is possible that the adolescents' own smoking behavior influenced their decision to classify their mothers as smokers. In addition, because age and experimentation were moderately correlated ($r = 0.22, p < .01$), older adolescents may have interpreted some parental smoking behaviors, like experimentation, as a manifestation of earlier smoking and therefore misclassified their mothers (Pomerleau et al., 2005).

Overall, the kappa values in our study were moderate but the percent agreements were high. It has been suggested that kappa values are influenced by the bias and prevalence of the outcome (Banerjee & Fielding, 1997), such that a high prevalence index (when the prevalence of a positive rating is very high or very low) results in lower kappa values (Sim & Wright, 2005). In our study, the prevalence of nonsmoking was very high, and the bias, or the extent to which raters disagree, was also low, leading to the moderate kappa values.

Our study had several limitations. First, the mothers' self-reported smoking status was not biochemically validated. Second, smoking data from fathers were limited, so we could not reliably compare father and adolescent reports. Third, the mother and adolescent data were not collected concurrently. However, maternal data were available from two timepoints, one before and another after the adolescents' reports on their mothers' smoking behavior. Fourth, unfortunately while we have detailed data from the mothers about their smoking behavior (e.g., self-reported level of nicotine dependence, number of cigarettes smoked per day, when first cigarette is smoked during the day), we did not have similar information from the children regarding the mothers' smoking behavior. Therefore, we are unable to address the important issue of whether adolescents can provide more detailed information about their parents' smoking behaviors, other than whether or not they do/did smoke.

In conclusion, the results of this study indicate that adolescent proxy reports on maternal smoking are accurate, suggesting that adolescent reports on mothers' smoking behavior can be used as a proxy to obtain data if the mothers' self-report data are not available. Our results further suggest that when reports are not collected concurrently, it may be more reliable to use self-report data that were obtained from the mothers prior to the proxy report obtained from their adolescents, rather than the other way around. In addition, in future studies, if the adolescent's proxy report is used in lieu of the mother's report, whenever possible, analyses should control for the adolescent's age and experimenter status. Finally, the results suggest that latent variable modeling is warranted.

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Declaration of Interests

None declared.

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