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Changes in Risk Perception following a Smoking Cessation Intervention: The Role of Acculturation in a Sample of Latino Caregivers

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Abstract

The present exploratory study examined the role of acculturation in the perception of the risks of smoking following a smoking cessation induction intervention among Latino caregivers of children with asthma. The sample consisted of 131 Latino smokers (72.9% female; 18.3% born in the U.S.) who were caregivers of a child with asthma. Caregivers were randomized to one of two smoking cessation interventions that were part of a home-based asthma program. Self-report measures of risk-perception were assessed at baseline, end of treatment (2 months after baseline), and 2- and 3-months post-treatment. At baseline, caregivers, regardless of level of acculturation, reported moderate to high levels of concern about the effects of secondhand smoke on their child's health as well as perceived risk regarding the effect of smoking on their own health. However, caregivers who were low in acculturation had a greater increase in concern about the effects of smoking on their child from pre- to post treatment compared to those who were high in acculturation ($p=.001$). Lastly, level of acculturation moderated the association between caregivers' concern about smoking on their child's health and their motivation to quit smoking ($p<.05$), but not cessation rates or reduced secondhand smoke exposure ($p>.05$). Specifically, motivation to quit at 3 months was greater for those with low acculturation. Though exploratory, these findings suggest that risk perception may be more easily influenced in low versus high acculturated populations and

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this should be considered in the design of clinical interventions and potentially mass media campaigns seeking to influence risk of caregiver behavior on child health with ethnic and racial minorities.

Introduction

Latinos have a much higher prevalence of asthma and asthma morbidity relative to non-Hispanic White and Black Americans (Lara, Akinbami, Flores, & Morgenstern, 2006). Children's secondhand smoke exposure (SHSe) from caregivers is associated with the development and exacerbation of asthma (Strachan & Cook, 1998). However, it is estimated that 30-50% of caregivers of children with asthma are smokers (Liem, Kozyrskyj, Benoit, & Becker, 2007). In a recent study of inner-city children with asthma, 68.5% had cotinine levels indicating tobacco smoke exposure (>1 ng/mL) (Kumar et al., 2008). Among caregivers in that study, 31.3% reported active smoking, and 49.6% of families had at least one smoker in the home (Kumar et al., 2008).

Level of acculturation to US norms and customs appears to influence both knowledge of health harms of smoking among Latinos (Constantine et al., 2009), as well as their smoking prevalence (Bethel & Schenker, 2005). Higher levels of acculturation are associated with greater smoking prevalence (Abraido-Lanza, Chao, & Florez, 2005; Corral & Landrine, 2008). Paradoxically, greater levels of acculturation are also associated with greater knowledge of the health effects of smoking (Constantine et al., 2009). One reason for this discrepancy might be that, although Latinos have greater knowledge of the harms of smoking, they also have lower levels of perceived *personal* risk of smoking. That is, greater knowledge of potential harms does not necessarily translate to "doing this will harm me." This is supported by the extant research which suggests that greater knowledge of the potential harms due to risky health behaviors is not sufficient to lead to behavior change (Codern et al., 2010). Rather, it may be more important to increase the individual's perception of the relevance of the risk to themselves and their current life circumstances (Joseph, Burke, Tuason, Barker, & Pasick, 2009; Weinstein, 1999). For example, it appears that smokers may "reconstruct" their own relevant risk by viewing the risk through the "lens" of their own feelings (e.g., relieves stress) and personal experiences (e.g., socialization tool), while also having the belief that it is their right to do as they choose with their life (Codern et al., 2010). Therefore, this suggests that a parent might rationalize that, although smoking might be potentially harmful to their long-term health, it also helps to make them a calmer and better parent by providing stress relief and needed social outlets. Moreover, even with new knowledge of the harms of smoking, smokers may altogether discount the potential health effects as something that happens to others but is less likely to happen to them (Weinstein, 1999).

Research investigating the association between perceived risk and acculturation is quite limited. Helweg-Larsen et al (2008) found in a sample of Bosnian refugees, that level of acculturation was related to knowledge regarding the general risks of smoking ($r = .37$), but was unrelated to the personal risks of smoking. Graves et al (2008) found that acculturation was not associated with perceived personal risk of breast cancer in a sample of Latina

women. To date, only one study has specifically investigated the association between acculturation and perceived risk for smoking in a Latino sample. They found that bicultural Latinos (defined as speaking both English and Spanish fluently) had lower levels of perceived risk from smoking compared to Latinos who were less acculturated (reported speaking “only Spanish” or “Spanish better than English” (Bock, Niaura, Neighbors, Carmona-Barros, & Azam, 2005). However, this study used only one language fluency question as a proxy to classify acculturation, did not assess children's secondhand smoke exposure, and did not assess for changes in risk perception following the smoking cessation intervention.

Having a better understanding the relationships between perceived risk, acculturation, and smoking cessation would be useful for the development of interventions aimed at reducing Latino smoking. The current study is an exploratory, secondary analysis of a smoking cessation induction trial with Latino caregivers of children with asthma (Borrelli et al 2010). The present study first explores the association between caregiver's acculturation level and their perceptions of the risks of smoking to themselves and their children. We hypothesized that higher acculturation would be associated with lower smoking risk perception, given the findings of a previous studies (Bock et al., 2005). We also explore acculturation as a moderator of *change* in risk perception during treatment. To our knowledge, no study has assessed the association between acculturation and *change* in risk perception. Finally, we followed up on significant interactions between acculturation and perceived risk to explore how these associations impacted caregivers' motivation to quit smoking, smoking status, and their children's exposure to secondhand smoke in the home. We utilized a multicomponent acculturation scale to provide a more comprehensive measure than a single dimension of language and, unlike other studies, we assessed caregiver perception of the risks of smoking to themselves and their concern about the effects of smoking on the health of their child.

Methods

Study Design and Sample

The present study is a secondary analysis of data from a randomized, controlled trial in which caregivers who smoked received home-based asthma education for their child from a bilingual Latina health educator (Borrelli et al., 2010). Participants were randomized to receive one of two smoking cessation counseling interventions integrated into the asthma program, both of which included three in-home counseling sessions delivered over an 8-week period. The first intervention utilized a motivational interviewing (MI) framework in the context of providing physiological feedback to caregivers regarding smoke exposure to themselves and their child. Feedback was delivered both verbally and graphically and included caregiver's carbon monoxide level and symptoms associated with that level as well as the level of secondhand smoke their child was exposed to over the previous week (i.e., “Your child breathed in as much smoke as if he smoked X cigarettes last week.”). Moreover, it also was designed to be consistent with the values of the Latino culture as indicated by Marin & Van Oss Marin (1991); specifically the values of *personalismo* (i.e., importance of personal relationships), *familismo* (i.e, importance of family), and *simpatía* (i.e., interpersonal harmony) were incorporated into the intervention. For example, to foster

familismo, the counselor would discuss how existing familial supports could help them quit smoking and the benefits of quitting on their family.

The comparison intervention followed the clinical guidelines for smoking cessation employing the Five A's (Ask, Advise, Assess, Assist, and Arrange) and focusing on increasing caregivers self-efficacy to quit, overcoming barriers to quitting, setting small goals, self-monitoring, and reframing past quit attempts. Risks of smoking to self and to their child was not targeted and no objective feedback on smoke exposure was given.

Participants did not have to want to quit smoking to be enrolled in the study. Participants were eligible for the study if they (a) were Latino and 18 years of age, (b) were a caregiver of a child with asthma (< 18 years of age), (c) smoked 3 cigarettes per day and > 100 cigarettes in their lifetime, and (d) had not received a smoking cessation treatment (counseling or pharmacological) within the past 3 months. Participants were provided 8 weeks of transdermal nicotine patches at no cost at any time during the study if they were ready to quit smoking. The study was approved by our institution's human subjects review board.

Measures

Assessments were conducted in either English or Spanish (depending upon participant preference) at baseline, end of treatment (EOT), and 2 and 3 months following treatment. All measures were self-reported except that abstinence from smoking was also verified by exhaled carbon monoxide. Measures were administered by a research assistant blind to intervention condition.

Demographics and Smoking History—Participant age, gender, education, income, years living in the United States, and child's age and ethnicity were assessed. Measures of smoking history included number of years smoking, number of household smokers, and number of previous quit attempts, the Fagerstrom Test for Nicotine Dependence (Heatherton, Kozlowski, Frecker, & Fagerstrom, 1991), and number of cigarettes smoked per day.

Acculturation—The 12-item Short Acculturation Scale for Hispanics (SASH)(Marín, 1987) was used to assess participants' level of acculturation. Items are related to three factors: Language Use, Media, and Ethnic Social Relations. Example items include, "In which language(s) do you usually think?" (responses range from 'only Spanish' to 'only English'), "In general, in what language(s) are the movies, T.V. and radio programs you prefer to watch and listen to?" (responses range from 'only Spanish' to 'only English'), "Your close friends are:" (responses range from 'all Latino/Hispanics' to 'all Americans'). Consistent with SASH scoring instructions, the responses were averaged across items (range of scores was 1 through 4), and participants with an average score between 1 and 2.99 were categorized as "less acculturated" and those with an average score above 2.99 as "more acculturated" (Marín, 1987). The SASH showed strong internal reliability in the current sample ($\alpha = .92$).

Motivation to quit smoking—Motivation to quit smoking was assessed using the Motivation Ruler (Miller & Rollnick, 1991), which is a validated measure that assesses motivation to quit smoking and also predicts intentions to quit smoking and behavior (Boudreaux et al., 2012). The one-item ruler possible responses range from 1 = *not at all motivated* to 10 = *very motivated*.

Caregiver Concern about Child's Health—At baseline, EOT, and 2 and 3 months following treatment, one item was used to assess degree of caregiver concern about smoking on their child's asthma: "How concerned are you that smoking will make your child's asthma worse?" Possible responses to this item ranged from 1 = *not concerned* to 5 = *extremely concerned* (Borrelli, McQuaid, Novak, Hammond, & Becker, 2010).

Caregiver Perceived Risk to Self—Caregivers' perceived risk to self of smoking was assessed at baseline, EOT, and 2 and 3 months following treatment with three items (7-point scale each, 1 = *no chance* to 7 = *certain to happen*), assessing caregivers' beliefs of personal risk of developing cancer, coronary heart disease, and chronic lung disease if they continue to smoke (Borrelli et al., 2010). Scores ranged from 3 to 21. Previous research has shown that these three items have strong internal reliability ($\alpha=.90$) (Wagener, Gregor, Busch, McQuaid, & Borrelli, 2010). These items showed strong internal reliability in the current study (α ranged across different time points from 0.85 to 0.92).

Smoking Status—Smoking status was assessed at both the 2 and 3-month follow-up. Both 7-day point prevalence abstinence (7-day ppa) and continuous abstinence were measured. Seven-day ppa was defined as no smoking, not even a puff, in the last 7 days prior to the current assessment. In those self-reporting 7 day ppa, abstinence was biochemically verified using a Bedfont Smokerlyzer, calibrated to manufacturers specifications, measuring exhaled breath carbon monoxide (10ppm indicated abstinence; SRNT Subcommittee on Biochemical Verification, 2002). Continuous abstinence was defined as no smoking, not even a puff, since the last contact.

Secondhand Smoke Exposure (SHSe)—SHSe was objectively measured using passive nicotine monitors at baseline and at 3-month follow-up. Over the course of one week, one monitor was placed in the room which the child spent the most time and one was worn by the child. Nicotine collected from the monitors was analyzed by gas chromatography. The monitors have been tested and validated both in an environmental chamber and in homes and demonstrated accurate detection of nicotine (Caka et al, 1990; Hammond & Leaderer, 1987; Leaderer & Hammond, 1991). Measurements of nicotine from these monitors are measured in ng/ml.

Data Analysis

Using longitudinal regression models implemented with Generalized Estimating Equations (GEEs) with robust standard errors, we tested whether perceived risk to self and concern about child's health (absolute scores) changed over time and whether this change was moderated by level of acculturation. Models adjusted for treatment assignment (to control for an changes due to treatment differences), the baseline value of the specific risk variable

of interest (i.e., perceived risk to self or concern about child's health), nicotine dependence, child age and caregiver age, and number of previous quit attempts (Table 1 presents the correlation matrix of selected covariates). Covariates included in the models were chosen *a priori* and represent variables that were thought to or have been shown to be associated with caregiver perceived risk (e.g., child age in Wagener et al, 2010). Model fit was assessed both with and without these covariates and the final model was chosen based on best fit criteria (QIC were used to assess model fit with lower values indicative of better model fit). Moderating effects of acculturation were explored only in the adjusted regression models (and not in stratified analyses by acculturation level). In a separate set of models, we assessed whether early changes (baseline to end of treatment) in perceived risk to self and concern about child's health (both computed as change scores) were associated with smoking outcomes and attitudes (7-day PPA, continuous abstinence, level of SHSe, and motivation to quit smoking) at 2 and 3-month follow-up, and whether these effects were moderated by level of acculturation. Multivariate regression models were fit (logistic models for binary responses and linear models for continuous responses) which adjusted for the main effect of acculturation, treatment assignment, and nicotine dependence (which is known to be associated with smoking outcomes). All analyses were run using STATA SE Version 10.

Results

The total randomized sample for the larger study consisted of 131 Latino smoking caregivers of children with asthma; however, because of missing baseline data on acculturation, only 123 were analyzed. Table 2 displays participant demographics and baseline smoking behavior. Caregivers were 36.8 years old ($SD=9.6$) on average, predominantly female (72.9%) and 41.3% had at least high school education. The majority were not born in the U.S. (81.7%) and smoked 10.6 cigarettes per day at baseline ($SD=8.4$). Children were 7.1 years old on average ($SD=4.8$). In addition, 24% of participants were classified as highly acculturated.

Results indicate that caregivers' concern about the effects of smoking on their child's health increased over time ($b=0.28$, $SE=0.03$, $p<0.001$) and this effect was moderated by acculturation ($b=-0.27$, $SE=0.07$, $p<0.001$; see Table 3 for full model). Specifically, among those with low acculturation, concern about smoking on their child's health significantly increased over time (Figure 1), while participants who reported higher levels of acculturation did not demonstrate significant changes over time. The moderated effect of acculturation on caregiver's concern about the effects of smoking on their child's health predicted caregiver motivation to quit smoking at 3-month follow-up. Specifically, motivation to quit at 3 months was greater for those with low acculturation versus high ($b_{\text{perceived risk to child}}=0.78$, $SE=0.31$, $p=.02$; $b_{\text{acculturation} \times \text{perceived risk to child}}=1.85$, $SE=0.85$, $p=.03$). However, the moderated effect of acculturation on caregiver's concern about the effects of smoking on their child's health failed to predict 7-day PPA, continuous abstinence, and level of SHSe at all follow-ups ($p>0.05$; see Table 4 for caregiver smoking behavior and attitudes over time). There was no significant change in perceived vulnerability (self) over time ($p>0.05$), nor a moderating effect of acculturation.

Discussion

The current study was the first to investigate how acculturation may moderate the association between caregivers' perception of the risks of smoking to themselves, their children, and their smoking behavior and motivation to quit, both before and following a smoking cessation intervention. Contrary to previous research, (Bock et al., 2005) we found that Latino smokers had similar levels of perceived risk of smoking to themselves and concern about the effects of smoking on their child's health (moderate to high), regardless of their level of acculturation. A potential reason for this discrepancy is that we used a more comprehensive measure of acculturation than prior studies (Bock et al., 2005). It is possible that a one-item language fluency measure alone is not a sufficient measurement of acculturation. However, less acculturated Latinos demonstrated a significant increase in their perceived risk of smoking on their child's asthma compared to their more acculturated counterparts following a smoking cessation intervention. This finding suggests that less acculturated Latinos' risk perception regarding their children's risk may be more malleable and more responsive to smoking cessation interventions. With repeated exposure to risk messages and warnings, individuals can habituate to the warnings and perceive them as less relevant and dangerous (for a review see Stewart & Martin, 1994). It is possible that less acculturated Latinos had much less exposure to these risk messages and therefore were more open to accepting them. It may also be that Latinos with low acculturation may place particular importance on the health of their children (consistent with *familismo*).

Though preliminary, these findings could have implications for health care providers and potentially even mass media campaigns that specifically target new members of the Latino community in the United States. It is estimated that approximately 140,000 Latinos from Mexico alone immigrated to the United States in 2010 (Pew Hispanic Center, 2012). Intervening early-on before newly immigrated Latino's become more acculturated to U.S. norms could possibly curb the significant increase smoking prevalence that occurs with acculturation, (Abraido-Lanza et al., 2005; Corral & Landrine, 2008) especially given that the current study suggests that their perception of risk may become less malleable with acculturation.

Surprisingly, in the current sample, the differential increase in risk perception did not result in a difference in smoking outcomes or reduction in SHSe, but only in increased motivation to quit smoking. This finding may in part be due to the large percentage of women (72.9%) in the current study, and research had shown that acculturation is a stronger predictor of smoking in men (Castro et al., 2009). On the other hand, as discussed by Codern and colleagues (2010) this finding may underscore that risk is perceived through the context of an individual's life circumstances and that perceived risk alone is not always sufficient to create behavior change. Even in a situation where concern for one's child is likely very strong and motivating, other environmental circumstances, stressors, and norms may attenuate the strength of the relationship between perception of risk and behavior change. This view is consistent with the Operant Theory of acculturation and health behavior in that environmental "metacontingencies" for smoking may outweigh individual level factors like risk perception (Landrine & Klonoff 2004).

Though aware of the links between parental smoking and childhood illness, caregivers may discount smoking risk related information and create alternative explanations of cause (e.g., genetics, environmental pollution). A qualitative study by Robinson and Kirkcaldy (2007) examined why mothers continue to smoke around their children showed that mothers not only cite genetics and environmental factors as potential causes with which to discount smoking, but that they also discount that their child's health is any different than the children of non-smokers (even with evidence to the contrary). Moreover, it appears that caregivers can potentially hold both perceptions, that '*my smoking is harmful to my child*' and that '*my smoking is not harmful or the cause of my child's poor health*'; however, depending on the circumstances (e.g., increased stress, people they are with) the caregiver finds themselves in determines what thought is in the foreground or the background (Robinson & Kirkcaldy, 2007). Whatever the reason, the results suggest that changing parental smoking behavior to affect children's secondhand smoke exposure is complicated and likely requires a multifaceted approach. Future research may help to address the validity of these hypotheses by conducting interviews with caregivers following their completion of smoking cessation clinical trial and addressing why elevated perception of their child's risk was not enough to affect change.

Although we used a valid measure of acculturation, more detailed analyses investigating gender effects and country of origin influences were not completed in the current study due to sample size limitations. A second limitation is that caregivers in this study had relatively high levels of perceived risk of smoking to themselves and their child. This high level of risk may be due to the fact that the sample consisted of caregivers of children with a chronic illness (Borrelli et al., 2002). It is possible that for many caregivers we encountered a ceiling effect and limited the range with which changes in perceived risk increase and therefore masked a potential effect. With these limitations in mind, this exploratory study still adds new knowledge and suggests that concern about child's health may be more easily influenced in low versus high acculturated populations. Though replication will be needed and additional measures may need to be added to have a significant impact on behavioral smoking outcomes, these findings may provide useful considerations in the design of clinical interventions and potentially mass media campaigns seeking to influence risk of caregiver behavior on child health with ethnic and racial minorities.

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Figure 1. Caregiver Perceived Vulnerability of Child as a Function of Time and Acculturation

Table 1
Correlation Matrix of Pre-selected Covariates and Baseline Risk Variables

	Acculturation	Nicotine Dependence	Child age	Caregiver age	# previous quit attempts	Perceived Risk to Child	Perceived Risk to Self
Acculturation	--	--	--	--	--	--	--
Nicotine Dependence	.165	--	--	--	--	--	--
Child age	-.069	-.008	--	--	--	--	--
Caregiver age	-.065	-.017	.428**	--	--	--	--
# previous quit attempts	-.008	-.180*	.138	.036	--	--	--
Perceived Risk to Child	.313**	.181*	.013	-.116	.128	--	--
Perceived Risk to Self	.047	.053	.051	.114	-.102	.191*	--

** Correlation is significant at the 0.01 level (2-tailed)

* Correlation is significant at the 0.05 level (2-tailed)

Table 2
Baseline Characteristics between Low vs. High Acculturated Caregivers

Variables	Low Acculturated <i>n</i> = 92	High Acculturated <i>n</i> = 31	<i>p</i> -value
Demographics			
Caregiver age (years)	37.4(9.8)	35.6(8.1)	ns
Child age (years)	7.2(5.0)	6.4(4.6)	ns
% Female (caregiver)	72.8%	67.7%	ns
% Female (child)	39.6%	25.8%	ns
% Born in the United States	7.6%	45.2%	<.001
Years in the United States	13.2(8.8)	28.4(10.1)	<.001
% Employed (full or part time)	35.2%	43.3%	ns
% High school or GED	32.6%	67.7%	.001
Smoking History			
Cigarettes per day	10.5 (8.5)	12.5 (8.5)	ns
Nicotine Dependence	3.7 (2.5)	4.6 (2.2)	ns
# of lifetime quit attempts	3.0 (5.0)	3.0 (4.8)	ns
% live with another smoker	31.5%	32.3%	ns
% visit Emergency Department for asthma within last year	59.5%	71.4%	ns
% hospitalized for asthma with last year	66.2%	68.0%	ns

Table 3

GEE Modeling Results of Risk Outcomes

Concern for Child's Health	Coef.	Std. Err.	z	p-value	95% CI
Time	.278	.034	8.11	0.000**	.187 .314
Treatment Group	.064	.073	0.88	0.379	.001 .237
Acculturation	.324	.324	2.77	0.006**	.031 .615
Time x acculturation	-.266	.068	-3.90	0.000**	-.366 -.102
Nicotine Dependence	-.009	.015	-0.59	0.553	-.049 -.003
Child age	.003	.008	0.37	0.713	-.010 .011
Caregiver age	-.001	.004	-0.21	0.832	-.003 .009
# previous quit attempts	-.001	.0004	-2.35	0.019*	-.001 -.001
Perceived risk to child	.928	.111	8.38	0.000**	.510 .701
Constant	3.35	.189	17.72	0.000	.847 1.884
Perceived Risk to Self	Coef.	Std. Err.	z	p-value	95% CI
Time	-.349	.298	-1.17	0.243	-.934 .236
Treatment Group	-.783	.444	-1.76	0.079	-1.65 .089
Acculturation	-.035	.030	-1.15	0.248	-.094 .024
Time x acculturation	.889	.583	1.52	0.127	-.254 2.03
Nicotine Dependence	.094	.089	1.06	0.287	-.079 .268
Child age	.046	.050	0.91	0.363	-.053 .144
Caregiver age	-.020	.024	-0.83	0.408	-.068 .028
# previous quit attempts	.001	.002	0.58	0.564	-.003 .005
Perceived risk to self	.443	.057	7.75	0.000**	.331 .555
Constant	12.12	1.38	8.77	0.000	9.409 14.829

** Significant at the 0.01 level (2-tailed)

* Significant at the 0.05 level (2-tailed)

Table 4
Low vs. High Acculturated Caregiver Smoking Behavior and Attitudes over Time

Variables	Low Acculturated <i>n</i> = 92 M (SD) or % (n)	High Acculturated <i>n</i> = 31 M (SD) or % (n)
Perceived Risk to Self		
Baseline	15.4 (4.1)	15.9 (4.0)
End of Treatment	18.3 (2.8)	15.3 (5.4)
2-month follow-up	17.5 (4.2)	16.4 (4.3)
3-month follow-up	17.5 (3.6)	16.3 (3.7)
Perceived Risk to Child		
Baseline	4.0 (0.8)	4.5 (0.6)
End of treatment	4.6 (0.9)	4.7 (0.6)
2-month follow-up	4.9 (0.4)	4.4 (0.8)
3-month follow-up	4.9 (0.4)	4.5 (0.8)
7-day PPA		
End of treatment	8% (7)	7% (2)
2-month follow-up	21% (19)	19% (6)
3-month follow-up	23% (21)	16% (5)
Continuous Abstinence		
2-month follow-up	15% (14)	13% (4)
3-month follow-up	20% (18)	10% (3)
Secondhand Smoke Exposure		
Baseline - Home monitor	.77 (1.26)	1.31 (1.65)
3-month follow-up – Home monitor	.43 (0.89)	0.79 (1.40)
Baseline – Child-worn monitor	.96 (2.50)	0.85 (1.21)
3-month – Child-worn monitor	.67 (1.81)	0.75 (1.16)
Motivation to Quit		
Baseline	7.7 (2.7)	6.8 (3.4)
End of treatment	8.9 (1.6)	8.5 (1.6)
2-month follow-up	8.8 (1.8)	7.8 (2.7)
3-month follow-up	8.4 (2.0)	6.9 (3.4)