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The Relationship Between Receptivity to Media Models of Smoking and Nicotine Dependence Among South African Adolescents

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Abstract

The purpose of this study is to determine the association of receptivity to media models of smoking and nicotine dependence among South African adolescents from four ethnic groups. A stratified random sample of 731 adolescents aged 12 to 17 years (mean=14. 55, SD=1.68) was drawn from Johannesburg, South Africa. A structured questionnaire was administered to the participants in their homes by trained interviewers. Receptivity to media models of smoking was assessed with a three-item Likert scale. The dependent variable, nicotine dependence, was assessed with the Fagerström Test for Nicotine Dependence (FTND). Regression analyses showed a positive relationship between media receptivity and nicotine dependence, with control on demographic variables and hours of TV watched by the adolescent. This relationship was found to be strongest among White adolescents and weakest among Black adolescents. Though equally receptive to media models of smoking, Black adolescents have lower FTND scores than their peers from other South African ethnic groups. This may be related to the low prevalence of images in South Africa depicting Black people smoking cigarettes. Cultural norms against smoking among Black adolescents may also serve as a protective factor.

Keywords

Adolescence; South Africa; Nicotine dependence

Tobacco use and dependence among adolescents are considerable problems in the United States and other countries. The addictive properties of nicotine have particularly strong effects during adolescence (DiFranza et al., 2000; DiFranza et al., 2002). Animal studies show that nicotine self-administration is acquired more readily in adolescent than in adult rats (Levin, Rezvani, Montoya, & Rose, 2003). Early addiction to nicotine, in turn, is associated with a greater likelihood of continuous and heavy smoking patterns over time, and with the development of tobacco smoking-related illnesses such as respiratory and cardio-vascular diseases (Mitchell, Sobel, & Alexander, 1999).

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Research in the United States and Western Europe has shown that adolescents' smoking initiation, levels of tobacco use, and susceptibility to smoking are related to media receptivity (Braverman & Aarø, 2004; Chen, Cruz, Schuster, Unger, & Johnson, 2002; Choi, Ahluwalia, Harris, & Okuyemi, 2002; Dalton et al., 2003; McCool, Cameron, & Petrie, 2001). Media receptivity is a construct referring to the influence of pro-tobacco media on the individual. Accordingly, it has been defined as "an affinity to advertising messages from pro-tobacco media, including interests in, a willingness to accept, and readiness to internalize media messages" (Chen et al., p. 98). Most research on media receptivity has focused on explicit pro-tobacco advertising and tobacco promotional items. For example, adolescents' receptivity to pro-tobacco media is often assessed by asking respondents questions on whether they recognize certain tobacco advertisements, have a favorite tobacco ad, have a favorite brand of cigarettes, own tobacco promotional items, and are willing to use these promotional items (Evans, Farkas, Gilpin, Berry, & Pierce, 1995). Current anti-tobacco legislation in South Africa, and specifically, the Tobacco Products Control Amendment Act (South African Department of Health, 2000), is consistent with the Framework Convention on Tobacco Control that was adopted by the World Health Organization in 2003 (WHO, 2003). The Act bans all forms of pro-tobacco advertising, and specifically prohibits advertising and sponsorships by tobacco companies of sporting and other entertainment events, as well as of individuals. The act also bans smoking in public places, imposes heavy taxes on tobacco products, requires the presence of warning labels on tobacco products, and prohibits the sale of tobacco products to those under the age of 16 years.

Despite existing bans on advertisements, young people in South Africa continue to be exposed to tobacco products via the media, including the internet, magazines, newspapers, and films that are imported from other countries. In addition, a particularly covert way of marketing tobacco to adolescents in the face of heavy regulations is the use of positive images of people smoking in popular media (Distefan, Pierce, & Gilpin, 2004; Ling & Glantz, 2002). Representations of smoking in TV shows and movies are pervasive (McCool et al., 2001). The release of previously secret tobacco industry documents has provided evidence for the tobacco industry's explicit intentions to use movies and movie stars to portray smoking in a favorable light, especially to younger audiences (Ling & Glantz, 2002; Mekemson & Glantz, 2002). Adolescents who are younger than 18 years seem to be particularly vulnerable to tobacco product placement as their recall of tobacco products, including of specific cigarette brands, in movies has been shown to be superior to that of other age groups (Mekemson & Glantz, 2002). Adolescents' exposure to such positive images of smoking may have a particularly powerful effect on their smoking behavior because they are in the process of developing personal identities (Chen et al., 2002). During adolescence, the search for a personal identity often entails the admiration and emulation of role models such as pop stars, actors, and famous athletes. Adolescents are inclined to model the smoking behavior of such role models if they perceive them as worthy of admiration. Exploiting this knowledge, tobacco companies have not only tried to place their products in movies but have also supplied actors with free cigarettes and made efforts to publicize photographs of these actors smoking their brands (Mekemson & Glantz, 2002).

Several studies conducted in the United States have linked exposure to media models of smoking with positive attitudes to smoking (Sargent et al., 2002), smoking initiation (Dalton et al., 2003), and higher levels of smoking (Tickle et al., 2001). For example, a study by Distefan et al. (2004) found that among US American adolescents, having a favorite movie star who had appeared smoking on screen in the previous two years was independently related to higher odds of smoking initiation. However, little is known regarding the specific ways in which exposure to media images of smoking influences smoking behavior among adolescents (Shadel, Niaura, & Abrams, 2004).

Our study adds to existing research on the relationship between media models of smoking and adolescent tobacco use by utilizing the important construct media receptivity with regard to viewing media models of smoking. In addition to assessing exposure to media models of smoking the concept includes the subjectively perceived influence of this exposure on the adolescent. Media receptivity in this study thus refers to a tendency to develop more positive attitudes and beliefs about smoking and to be more willing to smoke cigarettes as a result of viewing media models engaged in smoking.

While the relationship between media receptivity and initiation and frequency of smoking in adolescents is relatively well established (Chen et al., 2002), little is known regarding the association between media receptivity and nicotine dependence. However, nicotine dependence is an important facet of adolescent tobacco use because despite less frequent smoking, adolescents tend to develop dependence more rapidly than adults (Levin et al., 2003). In addition, in South Africa, nicotine dependence may be a better measure of severity of adolescent tobacco involvement than frequency of smoking because many South African adolescents do not smoke as often as they may want to, due to limited economic resources to purchase cigarettes at will (Panday, Reddy, Ruiter, & Bergström, 2003). This fact may obscure the true relationship between media receptivity and tobacco habits among these youths. Symptoms of nicotine dependence, however, may manifest even in occasional smokers (DiFranza et al., 2000). The current study therefore investigated the association between receptivity to media models of smoking and nicotine dependence among South African adolescents from four ethnic/racial backgrounds.

Two additional goals of this study were to assess ethnic variations in the degree to which adolescents are receptive to media models of smoking, as well as in the relationship between media receptivity and levels of nicotine dependence. Some research conducted in the United States has shown that receptivity to pro-tobacco media varies by ethnic group (Chen et al., 2002). In particular, White adolescents showed higher levels of receptivity to tobacco advertising than Asian-American, Latino, and African-American adolescents (Chen et al., 2002) In addition, in a multivariate context, the relationship between media receptivity and 30-day smoking was statistically significant only for Latino and White adolescents, but not for Asian-American and African-American adolescents. Differential cultural norms about smoking may in part be responsible for such findings.

Because norms for tobacco use may differ among different ethnic groups in South Africa (Panday, Reddy, Ruiter, Bergström, & de Vries, 2005), it is possible that the relationship between receptivity to media models of smoking and nicotine dependence is stronger in cultural groups in which smoking is more socially acceptable. On the other hand, if smoking is not consistent with cultural norms, then tobacco dependence is likely to be less strongly related to media receptivity. In South Africa, smoking seems to be most acceptable among White and Coloured adolescents, which is reflected in their higher rates of tobacco use compared to those of other South African ethnic/racial groups (King et al., 2003; Reddy et al., 2003; Swart, Reddy, Panday, Philip, Naidoo, & Ngobeni, 2004)[2]. It is likely that the relationship between receptivity to media models of smoking and nicotine dependence is strongest among White and Coloured adolescents since they seem to encounter fewer socio-cultural barriers to smoking than other ethnic groups. In addition, anecdotal evidence suggests that most representations of smoking in the South African media (e.g., on TV and in movies) are of White people. Identification with and subsequent emulation of such representations are more likely to occur if adolescents perceive themselves as similar to (e.g., by being from the same ethnic and/or racial background

[2]South Africans were categorized according to their race during apartheid as “Black African” (of African descent), “Coloured” (of mixed European and African descent), “Indian” (of Asian/Indian descent) or “White” (of European descent). These racial categories continue to be employed by the South African census. The authors do not subscribe to these classifications in any way.

as) the person who is represented as smoking (McCool et al., 2001, Gray, Amos, & Currie, 1996). For example, a study by Shadel, et al. (2004) found that adolescent females had a more positive reaction to female-valenced cigarette advertising imagery (i.e., advertising that depicts attractive females smoking cigarettes) than to male-valenced cigarette advertising imagery.

The current study was conducted to examine whether (a) receptivity to media models of smoking is related to nicotine dependence; (b) there are ethnic differences in adolescents' receptivity to media models of smoking; and (c) there are ethnic variations in the relationship between receptivity to media models of smoking and levels of nicotine dependence among adolescents in South Africa.

METHOD

Participants

The sample for this study consisted of 731 adolescents (53% female) residing in Johannesburg, South Africa. The adolescents were 35% "Black African" (N=259), 30% "Coloured" (a South African term for people of mixed ancestry, N=222), 27% "Indian" (N=194), and 8% "White" (N=56). Their ages ranged from 12 to 17 years with a mean age of 14.55 years (SD=1.68). On average, they reported living with five other people in their households (ranging from 0–20). In addition, 51% of the participants reported living with both biological parents, 55% reported living with their biological father, 81% reported living with their biological mother, and 14.5% reported living with neither their biological mother nor their biological father. Out of a list of 12 amenities (including a television, a stove etc.), 48% of the adolescents reported owning 9 or fewer and the remaining 52% reported owning more than 9 amenities. Mean number of amenities in the household was 9.

Procedure

A stratified random sampling approach was used to obtain the sample. Census enumerator areas were stratified by race and socioeconomic status, based on the 1996 population census. Socioeconomic status of census enumerator areas was determined through employment rates of the heads of households within those areas. The adolescent participants were recruited from households within the selected census enumerator areas. A starting point was designated randomly for each area, and every tenth household was visited to determine if an eligible adolescent (aged 12–17 years) resided there. When more than one adolescent in a household qualified for the study, one adolescent was selected at random to participate.

Both parental consent and adolescent assent were obtained. Fieldworkers received several days of training in interviewing skills, questionnaire completion, sampling procedures, ethical considerations (such as consent procedures and confidentiality), and techniques for identifying and recruiting eligible adolescents for the study. Interviewers interviewed the adolescents in their homes with a structured questionnaire. The parents were not present during the interviews. Most participants were interviewed by an interviewer of the same gender and ethnicity. The interviews were conducted in the respondents' language of choice, including English, Afrikaans, SeSotho, or IsiZulu. Each respondent, reading a copy of the questionnaire, answered aloud after the interviewer read the questions out loud. For questions on smoking behavior, the respondent and interviewer exchanged booklets, and the respondent marked his or her own responses directly on the questionnaire. The respondents were assured that their answers were confidential. The consent forms and research protocols were approved by the Institutional Review Board of the New York University School of Medicine in the United States and by the Ethics Committee of the University of Pretoria in South Africa.

Measures

The dependent variable, nicotine dependence, was a continuous variable assessed by the Fagerström Test for Nicotine Dependence (FTND) (Heatherton, Kozlowski, Frecker, & Fagerström, 1991). The FTND consists of 6 items assessing indicators of nicotine addiction on a continuous scale (e.g., smoking when sick, difficulty refraining from smoking in forbidden places, and smoking shortly after waking up in the morning). The FTND has been used with adolescents and has demonstrated acceptable psychometric properties (Robinson, Berlin, & Moolchan, 2004). In the current study, the measure yielded adequate internal consistency (Cronbach's $\alpha = .62$).

The primary independent variable, media receptivity, was assessed by a three-item scale. Each item asked the adolescents how strongly they agreed that seeing an actor or actress, or pop star whom they liked smoke had particular effects on them. The three effects were: a) want to smoke a cigarette, b) feel less worried about the health effects of smoking, and c) think that smoking is glamorous. Answering options for each item ranged from "1" (strongly disagree) to "4" (strongly agree). Cronbach's alpha for this measure of receptivity to media models of smoking was $\alpha = .63$.

The control variables for the study were age, gender, ethnicity, socio-economic status, and average number of hours of television exposure. Ethnicity was dummy-coded ("White," "Indian," "Coloured") with Black African, constituting the implied reference group. Gender was dummy-coded with "1" representing males and "0" representing females. Socio-economic status was assessed by a list of amenities (see above). The measure of average number of hours of TV exposure was computed by averaging the number of hours of TV watched on a typical weekday and the number of hours of TV watched on a typical weekend day.

RESULTS

White adolescents in the sample had the highest mean score on the FTND and this score differed significantly from that of Black African adolescents ($p<.05$). In addition, Black African adolescents' scores were lower than Coloured and Indian adolescents' scores ($p<.05$). Males had a significantly higher score on the FTND than females ($t= -2.61$; $p = .01$). However, mean scores on media receptivity did not differ significantly by ethnicity or gender.

Bivariate correlations between score on the FTND and predictor variables were computed. Older adolescents had higher FTND scores than younger adolescents ($r = .28$, $p<.001$). Having more amenities in the household was not related to FTND scores at a statistically significant level ($r = .07$, $p<.10$), while watching more hours of TV was negatively related to FTND scores ($r = -.10$, $p<.01$). The correlation between media receptivity and FTND scores was $r = .32$ ($p<.001$).

Multiple regression analyses were conducted to assess the contribution of media receptivity to FTND scores, with control on age, gender, ethnicity, amenities, and average number of hours of TV exposure. Interaction terms assessed the ethnic variations in the relationship between media receptivity and FTND scores. As can be seen in Table 1, controlling for all other variables in the model, White, Coloured, and Indian adolescents differed from Black African adolescents in their levels of nicotine dependence as assessed by the FTND. Age and gender were significant and independent predictors of nicotine dependence. The number of hours of TV exposure was negatively, though not significantly, associated with nicotine dependence, whereas the number of household amenities was not a significant predictor of nicotine dependence. The relationship between media receptivity and nicotine dependence was positive and statistically significant for adolescents of all ethnic backgrounds; however, the strength of this relationship varied by ethnic group. In particular, Black African adolescents showed the

weakest relationship between media receptivity and FTND scores while White adolescents showed the strongest association (see Figure 1). When the regression analysis was repeated with White adolescents as the implied reference group, it became evident that the association between media receptivity and FTND scores was also significantly stronger for White adolescents than for Indian and Coloured adolescents. The relationship between media receptivity and FTND scores was robust across gender.

DISCUSSION

Our results suggest that receptivity to media models of smoking is related to nicotine dependence as measured by the FTND. Adolescents who were more likely to report that their attitudes and beliefs with respect to smoking became more positive as a result of being exposed to media models of smoking, had higher scores on the FTND. This relationship was strongest among White adolescents and weakest among their Black African counterparts, although mean levels of media receptivity did not differ by ethnicity/race. Our findings are consistent with research conducted in the United States which has linked both exposure to media models of smoking and receptivity to tobacco advertising with smoking initiation (Dalton et al., 2003) and higher rates of smoking in adolescents (Tickle et al., 2001). Our study extends these findings by showing that receptivity to media models of smoking is also associated with nicotine dependence as measured by the FTND. Nicotine dependence among adolescents is a particularly serious phenomenon as it sets the stage for heavy and continuous smoking patterns in adulthood (Colby, Tiffany, Shiffman, & Niaura, 2000; Lamkin & Houston, 1998).

The results of our study suggest that similar mechanisms of influence operate among South African and US-American adolescents. Adolescents who are in the process of developing personal identities (Chen et al., 2002) are particularly vulnerable to positive images of smoking, a fact that has been exploited by the tobacco industry (Ling & Glantz, 2002; Mekemson & Glantz, 2002). Seeing actors and pop stars smoke increases the likelihood of adolescents' initiating smoking and is related to greater frequency of smoking (Distefan et al., 2004; Pechmann & Shih, 1999; Gidwani, Sobol, DeJong, Perrin, & Gortmaker, 2002). Analyses of previously unreleased documents have shown that tobacco companies have attempted to associate cigarette smoking with popular actors by placing their products in movies and on TV and by supplying actors with free cigarettes (Mekemson & Glantz, 2002).

While much of the research on smoking shown in the media has been conducted in the United States, many of the movies and TV shows that are popular in South Africa originate from the USA. Consequently, despite South Africa's laws banning advertising, the tobacco industry's advertisements still seem to reach and have an effect on young people in South Africa. The results of the present study suggest that exposure to positive portrayals of smoking by their role models in the media influence adolescents' smoking attitudes and behavior, and their subsequent levels of nicotine dependence.

While levels of receptivity to media models of smoking were equivalent among the four ethnic groups, we found that the association between this variable and nicotine dependence varied by ethnicity. In particular, the association was strongest for the White adolescents. This may be because there are more representations of White people who smoke in the media, and White adolescents may identify more strongly with these predominantly White actors and pop stars than do adolescents from other ethnic/racial groups (Gray et al., 1996).

Another explanation for the strongest relationship between media receptivity and nicotine dependence among White adolescents may be due to the relatively low prevalence of cultural taboos against smoking among Whites. Previous research in South Africa has found that Whites smoke at significantly higher rates than Black Africans (King et al., 2003; Reddy et al.,

2003; Swart et al., 2004). These ethnic/racial differences seem to be particularly pronounced in women. In particular, there are strong cultural taboos against smoking for African women (Steyn, Bradshaw, Norman, Laubscher, & Saloojee, 2002), which seem to result in lower levels of cigarette use (Steyn et al., 2002; Marks, Steyn, & Ratheb, 2001). Similar taboos against smoking are likely to exist for Black African adolescents. Indeed, in the present study, Black adolescents reported significantly higher perceptions of cultural taboos against smoking than White and Indian adolescents. Thus, despite similar levels of receptivity to media models of smoking, Black adolescents may be less likely to smoke and develop symptoms of nicotine dependence than Whites because their culture does not support cigarette smoking. That is, among Black adolescents, some intervening factors may attenuate the relationship between the "triggering" of pro-smoking attitudes and beliefs, and actual cigarette smoking behavior and subsequent nicotine dependence. Future research should explore the role cultural values may play in explaining the differences in levels of smoking and nicotine dependence among South African adolescents.

Our research also revealed that the relationship between age and nicotine dependence was statistically significant. Older adolescents typically spend more time unsupervised by their parents and thus have greater opportunity to smoke cigarettes and develop symptoms of dependency. In addition, the longer the involvement in smoking the more likely the individual is to develop symptoms of nicotine dependence.

Finally, the number of hours spent watching television was negatively, although marginally, associated with nicotine dependence. It is conceivable that those adolescents who watch more hours of television are those who spend more time indoors and in the presence of parents and/or other caregivers who would likely restrict or not allow them to smoke. Parental monitoring is an important deterrent against adolescent smoking (Hawkins, Catalano, & Miller, 1992).

Despite its strengths, the study has several limitations. The use of a cross-sectional design precludes us from knowing the direction of the obtained relationships. For example, nicotine dependence may precede viewing media models of smoking, such that those who are more dependent on nicotine may be more likely than less dependent smokers or non-smokers to observe, focus on, and/or be influenced by seeing their favorite stars smoke cigarettes. Longitudinal studies would assist in determining the direction of the relationships, and the use of controlled experiments would help to determine whether causation is operative. In addition, the small number of White adolescents included in the study limits the generalizability of our findings somewhat. However, our results are consistent with other research which has shown that smoking rates are consistently higher among White adolescents and adults in South Africa as compared with Black Africans (e.g., King et al., 2003). Furthermore, there is currently a dearth of research employing the Fagerström Test of Nicotine Dependence in South Africa. As a result, there is a lack of reliability and validity data for the use of this instrument with adolescents from the different South African ethnic groups. Our study will contribute to the growing body of studies measuring nicotine dependence in South Africa. Finally, this study only focused on the relationship between receptivity to media models of smoking and nicotine dependence though there are a host of other important factors that contribute to the development of nicotine dependence in adolescents, for example familial (e.g., parental smoking), personality (e.g., susceptibility to tobacco use), and environmental factors (e.g., peer smoking) (Gilbert, 1995).

This study is unique in having examined a possible mechanism, receptivity to media models of smoking, through which indirect advertising may affect nicotine dependence among adolescents in South Africa. Despite the restrictions on advertising in the South African media, adolescents are still exposed to cigarette advertising by viewing media models engaged in smoking behavior, and this exposure seems to influence some adolescents' feelings and

attitudes about smoking. This receptivity to positive images of smoking, in turn, relates to adolescent symptoms of nicotine dependence, particularly among White adolescents. One recommendation would be for the government to impose the use of warning labels on television programs and at movies that portray cigarette use positively, alongside existing warning labels for films with strong language, nudity, sex, and violence (Sargent et al., 2004). A second recommendation is for antismoking advertisements to precede, succeed and/or be interspersed with such movies and television programs. A study by Pechmann and Shih (1999) found that showing a 30-second antismoking advertisement immediately before a film which portrayed adolescent smoking in a positive light, prevented adolescents from being influenced by this positive image of smoking. Thus, while it is impossible to shield young people completely from exposure to tobacco advertisements, it may be possible to influence how such advertisements affects their desire and willingness to smoke. Longitudinal research is needed to generate knowledge to inform programs that can counteract the effects of pro-tobacco advertising on adolescents' smoking behavior in South Africa.

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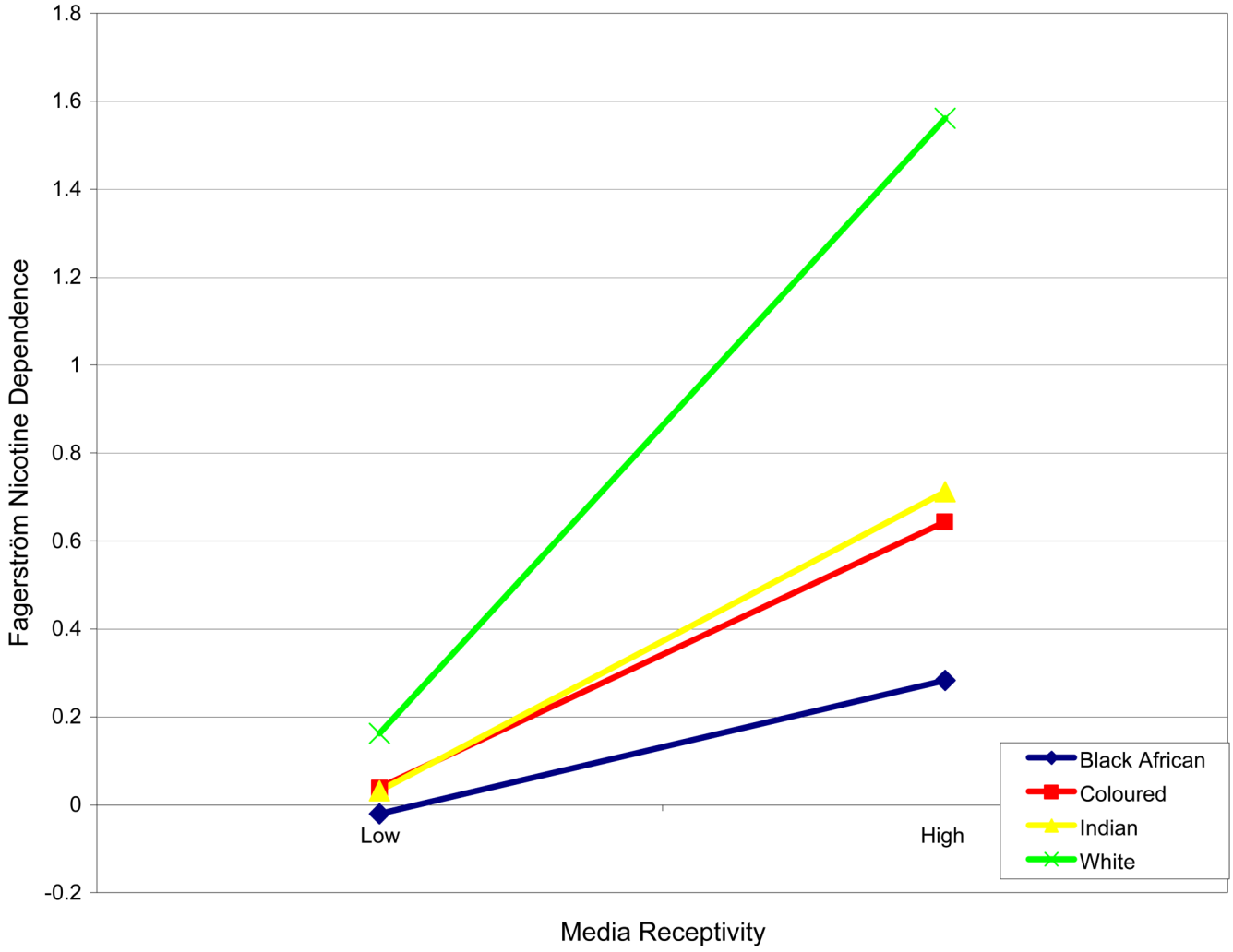

Figure 1.
Relationship between Receptivity to Media Models of Smoking and Nicotine Dependence for Black African, Coloured, White, and Indian Adolescents.

Table 1

Regression of Fagerström Test of Nicotine Dependence Scores on Media Receptivity (N=731)

Predictors	B	(SE)
Intercept	−1.97	(0.35)
Age	0.15***	(0.02)
Gender	0.16***	(0.07)
Amenities	−0.00	(0.02)
White	0.73***	(0.15)
Coloured	0.21*	(0.09)
Indian	0.24*	(0.11)
Average number of hours of TV per day	−0.03†	(0.02)
Media receptivity	0.08*	(0.04)
White × Media receptivity	0.28***	(0.07)
Coloured × Media receptivity	0.08†	(0.05)
Indian × Media receptivity	0.10†	(0.05)

† p < 0.1

* p< 0.05

** p < 0.01

*** p < 0.001.

Black African adolescents constitute the implied reference group.