

Gender and Age-Related Differences in Depressive Symptoms and Health Behaviors among Mexican Youth

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Abstract

Gender- and age-related differences in, and behavioral health correlates of, depressive symptoms were examined in 5152 Mexican university applicants aged 16-21 (55% female). Participants self-reported depressive symptoms (CESD-10) and health behaviors (smoking, alcohol use, physical activity). Overall, and from ages 17 to 20, significantly more female than male respondents met the cut-off for depression (CESD-10 scores ≥ 10). Logistic regressions controlling for age and parental education indicated that depressed young women were 82% more likely to smoke and 20% less likely to exercise than their non-depressed peers; depressed young men were 30% more likely to drink than non-depressed males. Findings extend knowledge on the developmental course and health consequences of depression by examining these processes in an international setting.

Keywords: Adolescents; Depression; Health behaviors; Mexico

Diferencias en Género y Edad Relacionados con Síntomas Depresivos y Salud de los Jóvenes Mexicanos Compendio

La asociación entre síntomas depresivos y el uso de alcohol, tabaco y actividad física, fueron examinados en 5152 aplicantes a la Universidad de San Luis Potosí en México de 16 a 21 años de edad (55% mujeres) por medio de un cuestionario anónimo. En general, y en particular entre las edades de 17 a 20 años, significativamente más mujeres que hombres presentaron depresión (CESD-10, puntaje ≥ 10). El análisis por regresión logística mostró una asociación positiva entre depresión y uso de tabaco entre mujeres (OR=1.82) y una asociación negativa con la actividad física (OR=0.80). Depresión entre los hombres jóvenes mostro una asociación positiva con el consumo de alcohol (OR=1.30). Nuestros resultados amplían el conocimiento sobre el desarrollo y consecuencias de la depresión en la salud de los jóvenes.

Palabras claves: Adolescentes; Depresión; Comportamientos de salud; México

As nations increase their standard of living, there is a shift in the relative burden of death and disability from conditions related to poor living conditions and lack of health care access (e.g., malnutrition, infectious

diseases) to conditions attributable to lifestyle factors (e.g., cardiovascular disease, psychiatric disorders; Murray & Lopez, 1997). Depression, the most common psychiatric disorder worldwide, is projected to become the second largest contributor to global disability by 2020 (Murray & Lopez, 1997). Adolescence has been identified as a crucial period for the development of mood disorders (Remick, 2002; Steinberg et al., 2006); therefore, there is an urgent need to consider both clinical (e.g., Benjet, Borges, Medina-Mora, Feiz, &

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Zambrano, 2004) and subclinical (e.g., Rohde, Beavers, Stice, & O'Neil, 2009) depression among adolescents.

The current paper examines depressive symptoms among Mexican adolescents and young adults. Mexico has the world's 11th largest population and 12th largest economy (CIA, 2009), and is the largest source of migrants to the U.S. (U.S. Census Bureau, 2009). In the U.S., Latino/a youth report higher levels of depressive symptoms than non-Hispanic White adolescents (Wight, Aneshensel, Botticello, & Sepúlveda, 2005); understanding the development of depression among Mexicans in their own country could shed light on this disparity. Moreover, given dramatic economic and social changes in Mexico, understanding the emergence of depression among Mexican adolescents has the potential to contribute to the broader literature in developmental psychopathology.

Adolescence in Mexico: Overview and Literature Review

In recent decades the experiences of Mexican adolescents have changed as the nation urbanized and developed a market economy. Secondary schooling became compulsory in 1993 and by 2000, three quarters of 13-15 year olds and 42% of 16-19 year olds were attending school (Meija-Arauz, Sheets, Villasenor, & Tello, 2007). Youth living in cities or from wealthy families have greater educational opportunities: 70% of 14-18 year old urban Mexicans (Urquiola & Calderón, 2005) and most (90%) middle class youth aged 15-19 (Meija-Arauz et al., 2007) are in school. The emergence of a Mexican middle class has led to increased opportunities for higher education, but many youth experience significant challenges to their well-being. Perhaps ironically, expanded educational opportunities may represent a growing source of psychological distress for adolescents in Mexico, as they must compete for a limited number of spaces in post-secondary institutions.

A great deal of attention has been devoted to behavioral health (particularly substance use and unsafe sex; Meija-Arauz et al., 2007), with less attention paid to psychological issues. Yet depression is increasingly recognized as a public health concern among Mexican adults. Large-scale or population-based studies of clinical depression in adult samples report past year prevalence rates ranging from 4.5% (Bello, Puentes-Rosas, Medina-Mora, & Lozano, 2005) to 6.1% (Slone et al., 2006). Early onset depression is a risk factor for later psychological and behavioral problems (Remick, 2002). In a random household survey, around 2% of Mexican adults experienced a depressive episode before age 18 (Benjet et al., 2004). The average Mexican is under age 25, highlighting the need to attend to depression among Mexican youth (Instituto Nacional de Estadística y Geografía, 2010).

There is emerging evidence that depression is a threat to adolescent health in Mexico, although methodological differences make it difficult to compare across studies. In one study, 3% of students at two universities reported moderate or severe depression on the Beck Depression Inventory (Gonzalez Ramirez, Landero Hernández, & García-Campayo, 2009). In various studies of adolescents, between 5% (Medina-Mora et al., 2003) and 8.2% (Gonzalez-Forteza, Jiménez-Tapia, Ramos-Lira, & Wagner, 2008) met clinical cut-offs for depression on different versions of the Center of Epidemiological Studies Depression (CESD) symptoms index. Elevated depressive symptoms are markedly higher (e.g., 25% among college students; Gonzalez Ramirez et al., 2009).

Gender and age are associated with both clinical and subclinical depression in U.S. and European samples. Depression is rare during childhood among both boys and girls, but rates increase and diverge with the result that by middle adolescence (ages 15-17), girls are twice as likely to be depressed as boys (Steinberg et al., 2006; for review, see Nolan-Hoeksema & Girgus, 1994; Zahn-Waxler, Shirtcliff, & Marceau, 2008). Gender disparities have been reported in major depression among Mexican adults (Bello et al., 2005; Slone et al., 2006) and in both clinical and subclinical depression among Mexican college students (Gonzalez-Forteza et al., 2008). Most studies of Mexican adolescents and young adults do not examine gender and age differences simultaneously, making it impossible to evaluate the developmental course of depression. A state-based population survey of 11-24 year olds reported that 11.6% of females and 3.8% of males met criteria for depression on the Zung scale (Arillo-Santillan et al., 2005), but age-related differences within gender were not reported. In a retrospective study, Slone et al. (2006) reported a greater increase in the prevalence of major depressive disorder during adolescence among women than men; however, it is unclear whether a similar pattern would appear in contemporaneous assessments. In an effort to build on this work and generate information that can be compared to the international developmental literature, our first goal was to examine gender and age patterns in depressive symptoms in a Mexican sample.

The second goal was to examine associations between depression and three behaviors that have implications for young people's current and future well-being – tobacco use, alcohol use, and physical exercise. These behaviors were selected because they represent means of affect regulation that are readily available to adolescents (Steinberg et al., 2006), including middle class youth in Mexico (e.g., Meija-Arauz et al., 2007). Furthermore, both substance use and obesity (which

is linked to physical inactivity) have been identified as areas of concern for Mexican adolescents (Instituto Nacional de Salud Pública, 2006; Mejia-Arauz et al., 2007). Depression has been linked to increased use of alcohol (Crum et al., 2008) and tobacco (Husky, Mazure, Paliwad, & McKee, 2008), and decreased physical activity (Motl, Birnbaum, Kubik, & Dishman, 2004; Petruzzello & Motl, 2006). In Mexico, the National Survey on Addictions indicated that depressed adolescents were more likely than their non-depressed peers to use drugs (Medina-Mora et al., 2003). Depression and smoking co-occurred among 11-24 year olds, with stronger associations for females than males (Arillo-Santillan et al., 2005).

The current study extends this work by examining whether depressive symptoms are associated with smoking and alcohol when controlling for the effects of age (which predicts both depression and substance use). To our knowledge, no studies have examined whether depression and physical activity are associated in Mexico; thus, this represents a novel contribution.

Overview of Current Study

Our overarching goal was to examine the prevalence and behavioral health correlates of depression among Mexican middle-to-late adolescents. We drew on data from a large-scale program of research being conducted in collaboration between the Universidad Autónoma de San Luis Potosí (UASLP) and the University of Illinois at Urbana-Champaign. First, we examined whether levels of depressive symptoms differ by gender and age. Second, we explored three behavioral health correlates of depression (smoking, alcohol use, physical exercise). Because prior research in Mexico has shown that socioeconomic status is positively associated with both depression (e.g., Slone et al., 2006) and substance use (e.g., Arillo-Santillan et al., 2005), we included parent education as a proxy for socioeconomic status.

Method

Sample

Participants were 16-to-21-year-old Mexican youth who applied to the UASLP in 2008 ($N = 5534$). The analytic sample consisted of 5152 respondents with complete data on variables used in the current analyses (55.2% female; M age = 18.2, $SD = 1.16$).

Procedures

The study was approved by Institutional Review Boards at the two collaborating institutions. Participants provided written consent to have their data used for research purposes. As part of a larger study, respondents completed a self-report questionnaire.

Measures

Demographics. Respondents reported their gender (0 = *male*, 1 = *female*) and age (in years). Highest level of education completed by either parent was categorized as: less than high school (30.5%), high school graduate (20.6%), and bachelor degree or higher (48.9%). Two parental education dummy variables were created with bachelor degree or higher as the reference category.

Depressive symptoms. Respondents completed the CESD-10 (or Boston 10; Kohout, Berkman, Evans, & Cornoni-Huntley, 1993). Items reflect the four dimensions of the original 20-item Center for Epidemiological Studies Depression symptoms index (depressed affect, positive affect, somatic complaints, and interpersonal problems). Respondents rated how often they experienced each symptom during the past week using 4 response options from *Rarely or none of the time (less than 1 day)* to *All of the time (5-7 days)*. Positive items were reversed and responses assigned point values (0 to 3) then summed. Possible scores range from 0 to 30; a score of 10 or higher is considered a positive screen for depression (Andresen, Malmgren, Carter, & Patrick, 1994).

To our knowledge, the CESD-10 has not been previously used in Mexico. However, the 20-item CESD has excellent psychometric properties in Mexican samples (e.g., Medina-Mora et al., 2003; Ramos-Lira, Wagner, Caballero-Gutierrez, & Gonzalez-Forteza, 2003). U.S. studies evaluating 10-item versions of the CES-D have reported acceptable psychometric properties compared to the 20-item measure (e.g., Andresen et al., 1994; Kohout et al., 1993), and the CESD-10 has been used with young women in Australia (Ball, Burton, & Brown, 2009). In the current sample, Cronbach's alpha for the CESD-10 was .80.

Health behaviors. Three dichotomous (0 = *no*, 1 = *yes*) items assessed health behaviors: "Do you smoke?", "Do you drink alcohol?" and "Do you do regular physical activity?"

Results

Gender and Age Patterns in Depressive Symptoms

Table 1 displays descriptive statistics overall and by sex. Nearly one quarter of respondents (23.51%) met the cut-off for elevated depressive symptoms (CESD-10 ≥ 10). In the overall sample, more female than male adolescents met the cut-off. The proportion of respondents meeting the criteria for depression did not differ significantly by gender at age 16 but from the ages of 17 to 20, significantly more young women than young men met the cut-off for depression. The gender discrepancy was also evident at age 21 but was not sta-

tistically significant, perhaps because of the relatively small number of participants in this age group.

Table 1
Prevalence of Depression and Health Behaviors by Age and Sex

	<i>N</i>	Depression	Smoking	Alcohol Use	Physical Activity
Males	2306	18.30*	19.51*	27.64*	67.22*
16	69	18.84	10.14	17.39	71.01
17	515	19.03*	14.17*	26.21*	70.10*
18	897	18.73*	16.05*	33.89*	69.34*
19	427	16.63*	24.59*	46.14*	66.98*
20	259	17.37*	32.05*	45.56*	59.85
21	139	19.42	27.34*	47.48*	55.40*
Females	2846	22.72*	11.10*	20.80*	55.27*
16	121	22.31	7.44	14.88	64.46
17	737	26.73*	7.46*	14.25*	59.16*
18	1146	28.80*	9.69*	19.98*	56.20*
19	500	28.80*	14.40*	25.00*	51.40*
20	246	26.42*	21.95*	33.33*	52.44
21	96	27.08	15.63*	34.38*	30.21*
Total	5152	23.51	14.87	27.64	60.62
16	190	21.05	8.42	15.79	66.84
17	1252	23.56	10.22	19.17	63.66
18	2043	24.38	12.48	26.09	61.97
19	927	23.19	19.09	34.74	58.58
20	505	21.78	27.13	39.60	56.24
21	235	22.55	22.55	42.13	45.11

* Significant gender difference within age group ($p < .05$).

Behavioral Health Correlates of Depressive Symptoms

Overall prevalence rates for smoking (14.9%), drinking (27.6%), and physical activity (60.6%) are displayed in Table 1. Results of gender comparisons indicated that men were significantly more likely than women to smoke, drink, and exercise overall, and within each age group starting at age 17 (with the exception of physical activity at age 20; see Table 1).

Logistic regressions were computed separately by gender to predict the three health behaviors from depression status while controlling for age and parental

education. All of the models were significant (Table 2). Net of controls, depression status was differentially associated with health behaviors by gender. Among males, depression was significantly associated with alcohol use: young men with CESD-10 scores of 10 or higher were 28% more likely to drink than those scoring below the cut-off. Among females, depression was significantly associated with smoking and physical exercise: young women with elevated depressive symptoms were 82% more likely to smoke and 20% less likely to engage in physical activity than their non-depressed counterparts.

Table 2
Logistic Regression Models Predicting Health Behaviors from Depression Symptoms

	Males (n = 2306)		Females (n = 2846)	
	OR	95% CI	OR	95% CI
<i>Smoking</i>				
Age	1.35***	[1.24, 1.47]	1.39***	[1.26, 1.54]
Parent completed HS (vs. college)	0.88	[0.67, 1.16]	0.53***	[0.38, 0.75]
Parent less than HS (vs. college)	0.80	[0.62, 1.02]	0.69**	[0.52, 0.90]
Depression	1.07	[0.82, 1.40]	1.82***	[1.42, 2.33]
Model χ^2	51.58***		76.08***	
<i>Alcohol Use</i>				
Age	1.34***	[1.25, 1.44]	1.38***	[1.27, 1.49]
Parent completed HS (vs. college)	0.72**	[0.58, 0.91]	0.62**	[0.49, 0.79]
Parent less than HS (vs. college)	0.59***	[0.48, 0.72]	0.51***	[0.41, 0.63]
Depression	1.30*	[1.04, 1.62]	1.21	[0.98, 1.48]
Model χ^2	93.48***		101.83***	
<i>Physical Activity</i>				
Age	0.86***	[0.80, 0.93]	0.84***	[0.78, 0.90]
Parent completed HS (vs. college)	0.73**	[0.58, 0.91]	0.84	[0.69, 1.02]
Parent less than HS (vs. college)	0.79*	[0.64, 0.97]	0.80**	[0.67, 0.94]
Depression	0.82	[0.66, 1.02]	0.80*	[0.68, 0.95]
Model χ^2	29.57***		42.64***	

Note. OR = Odds Ratio; CI = Confidence Intervals. * $p < .05$. ** $p < .01$. *** $p < .001$.

Discussion

Results of the current study replicate and extend prior work conducted primarily in the U.S. and Europe regarding the emergence of gender differences in, and behavioral correlates of, depression during late adolescence. Study strengths include the large sample, inclusion of adolescents of both genders, and the use of a validated depression measure.

Nearly one quarter of young people applying to a public university in central Mexico exhibited elevated depressive symptoms. The overall prevalence rate (23.5%) was similar to those reported in other studies of sub-clinical depression in Mexico (e.g., Gonzalez Ramirez et al., 2009). In our sample, more female than male adolescents reported elevated depressive symptoms (28% vs. 18%). The prevalence rate among these Mexican young women is comparable to the rate in another study using the CESD-10, which found that 29% of Australian women aged 22-27 met the cut-off for depression (Ball et al., 2009).

In addition to replicating the widely-reported gender difference in depression found in studies conducted primarily in North American and Europe (for review, see Nolan-Hoeksema & Girgus, 1994; Steinberg et al., 2006; Zahn-Waxler et al., 2008), we examined age-related differences in depressive symptoms by gender. To our knowledge, this is the first study to do so in a Latin American sample. The proportion of male and female respondents reporting elevated depressive symptoms did not differ significantly at age 16, diverged from ages 17 to 20, and became more similar at age 21. The findings are consistent with research conducted primarily in the U.S. (Zahn-Waxler et al., 2008) and retrospective reports by Mexican adults (Slone et al., 2006) indicating that gender differences in depression emerge and peak during adolescence. Scholars have examined a number of factors that might contribute to these developmental patterns among adolescents living in wealthy nations (see Zahn-Waxler et al., 2008). Our findings provide a foundation for future research elucidating the role of biological, personality, social,

and cultural factors in depression among youth growing up in Latin American nations facing rapid social and economic changes.

It has been widely reported that adolescents with clinical or subclinical depression are at elevated risk of engaging in behaviors that threaten their short- and long-term well-being (e.g., Crum et al., 2008; Husky et al., 2008; Motl et al., 2004). Building on prior Mexican studies, we examined whether these associations were evident when the potentially confounding effects of age and parental education were controlled. Results indicated that depressive symptoms showed differential associations with health behaviors by gender. Young women who reported elevated depressive symptoms were more likely to smoke and less likely to exercise than their non-depressed peers, whereas depressed young men engaged in increased alcohol use relative to those who were not depressed.

Similar findings for substance use have been previously reported across studies. For example, associations between smoking and depression were stronger for adult women than men in the U.S. (Husky et al., 2008) and for female than male youth in Mexico (Arillo-Santillan et al., 2005). The finding that depression is associated with alcohol use among Mexican young men is also consistent with a U.S.-based longitudinal study (Crum et al., 2008). Although the direction of effect was similar in the regression for young women, the coefficient for depression was not significant ($p = .07$). There is evidence that alcohol use is less common -- and less acceptable -- for Mexican women than men (e.g., Marín & Posner, 1995); thus, depressed young women may be less likely than their male counterparts to use alcohol as a means of affect regulation. Future research should examine the extent to which the associations between depression and substance use can be explained by considering gender-related norms and beliefs.

Given the lack of prior research on depression and physical activity among adolescents in Mexico, interpretation of these findings is necessarily exploratory. Depression status was associated with decreased physical activity for both genders, but the coefficient for males was not statistically significant ($p = .08$). These findings replicate work conducted primarily in the U.S. (e.g., Petruzzello & Motl, 2006). In the U.S., male college students are more likely to engage in physical activity and exercise than women (Buckworth & Nigg, 2004), and this was the case among the young people in our sample. If exercise is an expected part of the male gender role, depressed young men may be less likely to stop exercising when depressed. Again, future research is needed to elucidate these findings.

Limitations and Future Directions

This study adds to the literature on adolescent development in diverse settings. Despite its contributions, there are three key limitations that afford opportunities for future research. First, the sample is not representative of the general Mexican population. In Mexico (as in most Latin American nations), a relatively small proportion of the population has access to post-secondary education (Urquiola & Calderón, 2005); thus, college applicants are likely to be comparatively advantaged. However, respondents were applying to a large public university and nearly one third had parents who had not graduated high school; thus, there was diversity in socioeconomic status. A second limitation is that, although depressive symptoms were assessed with a validated instrument, the dichotomous measures of health behaviors were less than ideal. Future research should utilize more nuanced measures of these constructs. However, a similar proportion of young women in our study said they engaged in regular physical activity (55.3%) as in Ball et al.'s (2009) study, where 55.7% of respondents were categorized as engaging in moderate or high physical activity using a measure that combined frequency and duration of various types of exercise in the past week. Finally, the cross-sectional study design makes it impossible to determine the direction of effects between depression and health behaviors. Depression is typically considered a precursor to subsequent health behaviors (e.g., Crum et al., 2008, Steinberg et al., 2006), but there is emerging evidence of reciprocal relations from longitudinal studies (e.g., Ball et al., 2009; Marmorstein, 2009). Thus, to gain a more comprehensive picture, future research should explore longitudinal connections between depression and health behaviors.

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