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Contextual Amplification or Attenuation of the Impact of Pubertal Timing on Mexican-Origin Boys' Mental Health Symptoms

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A B S T R A C T

Purpose: To examine the role of neighborhood contextual variation in the putative association between pubertal timing and internalizing and externalizing symptoms among Mexican-origin boys.
Methods: In a sample of seventh-grade Mexican-origin boys (N = 353; $\bar{x}_{age}$ = 12.8 years) we assessed a range of secondary sexual characteristics, internalizing, and externalizing symptoms. Reports on all secondary sexual characteristics were collapsed and age-standardized to represent total pubertal timing. We also distinguished between the timing of physical changes driven by adrenal versus gonadal maturation. Boys' residential addresses were geocoded and American Community Survey data were used to describe neighborhoods along two dimensions: ethnic concentration and socioeconomic disadvantage. Three years later (in 10th grade) we re-assessed internalizing and externalizing symptoms. We examined the moderating influence of neighborhood ethnic concentration and neighborhood socioeconomic disadvantage on the prospective associations between puberty timing (total, gonadal, adrenal) and internalizing and externalizing symptoms.
Results: Earlier total pubertal timing predicted increases in externalizing symptoms, but only when Mexican-origin boys lived in neighborhoods low on ethnic concentration. Total timing results for externalizing symptoms were replicated for adrenal timing. Furthermore, early adrenal timing predicted increases in internalizing symptoms, but again, only when boys lived in neighborhoods low on ethnic concentration. No effects were observed for gonadal timing specifically.
Conclusions: Early pubertal timing, especially advanced physical changes initiated and regulated by adrenal maturation, have important implications for Mexican-origin boys' internalizing and externalizing symptoms, but these implications depend on neighborhood characteristics. Ethnically concentrated neighborhoods are protective for early-maturing Mexican-origin boys.

IMPLICATIONS AND CONTRIBUTION

Mexican-origin boys who mature early and live in neighborhoods low in Latino ethnic concentration are at increased risk for emotional and behavioral problems in adolescence. This research has implications for clinical providers, who should consider screening for broader contextual circumstances to determine the potential risk associated with boys' early puberty.

The timing of puberty has important implications for adolescent mental health problems, and scholars continue to emphasize the importance of filling major gaps in this literature [1]. For example, the mental health implications of pubertal timing for Mexican-origin boys, a large and rapidly growing population with high rates of mental health symptomatology [2,3], are not well documented [4]. Some studies suggest racial/ethnic differences in timing effects [5]; others show contextual

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differences in timing effects [6,7]. Ethnicity and context, however, are highly intertwined and difficult to disentangle [1]. We examined the prospective implications of pubertal timing on Mexican-origin boys' internalizing (i.e., mood and anxiety) and externalizing (i.e., behavior problem) symptoms. We also examined aspects of the neighborhood context as potential amplifiers or attenuators of timing effects in an ethnically homogeneous, socioeconomically diverse sample. Studies employing socioeconomically diverse samples of single ethnic groups present unique opportunities to disentangle ethnic differences from contextual differences in timing effects [1]. We examined timing relative to pubertal maturation generally, and relative to specific physical changes driven by adrenal versus gonadal maturational separately.

Two theoretical perspectives have been used to describe timing effects across gender and ethnic groups, although additional theoretical and empirical considerations support a within-group examination of timing effects among Mexican-origin boys. The developmental readiness hypothesis implicates early timing as a risk factor for internalizing and externalizing symptomatology; the maturation deviance hypothesis implicates any off-time development (early or late) as risky [8]. Both hypotheses involve multiple psychosocial, biological, and psychobiological factors as underlying mechanisms for observed timing effects [8]. Because Latinos are a heterogeneous group, and because the relevant factors are not randomly distributed across populations, an ethnically homogeneous investigation is warranted. Psychosocially, the timing of pubertal development reflects the coming of age experience and associated changes in social expectations and behavioral norms [8]. The nature of this experience varies by cultural, social, and contextual factors [9]. Among Latino and Mexican-origin families with adolescent-aged boys, scholars have documented high levels of parental control [10] and parental support of pubertal sons [11], along with higher levels of exposure to disadvantaged neighborhood contexts relative to their non-Latino counterparts [12]. Biologically, the relation between timing and symptomatology may reflect hormonal processes that organize neural circuits in the brain and, perhaps, alter stress sensitivity [13]. Yet, Mexican-origin adolescent boys have both higher (e.g., testosterone) and lower (e.g., estradiol) levels of relevant hormone concentrations compared with African- and European-American boys [14]. Psychobiologically, off-time youth may feel different or misunderstood because they navigate normative hormonal challenges at non-normative times [8]. For Mexican-origin boys, who are uniquely susceptible to broader sociocultural aspects of social differencing [15], off-time maturation may represent one more way in which they feel different from the broader adolescent population. The amalgamation of these factors may produce a context of male adolescent development to which prior findings do not generalize.

Concerning the different distributions of psychosocial, biological, and psychobiological factors across populations, our first aim was to document timing effects on internalizing and externalizing symptoms among Mexican-origin boys. Recognizing the dearth of research on timing effects among Mexican-origin boys, we reviewed research on pan-racial/ethnic, Latino, and Mexican-origin samples of boys. Regarding pan-racial/ethnic samples and internalizing symptoms, several studies suggest that early timing is a risk factor [16,17], others suggest that both early and late timing confer risk [5,18], and some show no associations [19]. Evidence for externalizing symptoms is more consistent with developmental readiness [1], but there are exceptions consistent with maturation deviance [20], or no timing effects [21]. One study found that Latinos were most susceptible to late timing effects [5]. Two studies found that Latino [22] or Mexican origin [9] boys experienced early timing risk similar to non-Latinos, but neither study design was capable of detecting late timing effects. Overall, findings support the need for studies capable of detecting late and early timing effects [8]. Finally, Mexican-origin boys tend to develop later than European- and African-American boys [23], which places them behind all girls and most boys. In light of this review, we hypothesized that being late relative to same age, co-ethnic peers may be especially risky for Mexican-origin boys.

Our second aim was to examine neighborhood context as a potential amplifier or attenuator of timing effects. Mexican-origin families are disproportionately exposed to poor, socioeconomically disadvantaged neighborhoods [12]. Neighborhoods, via their opportunities, norms, expectations, and reward/punishment structures, can alter the effects of off-time development [6,7]. Socioeconomically disadvantaged neighborhoods are thought to lack clear expectations for youth behavior and social support resources; they are also associated with chronic stress [24]. Exposure to multiple stressors simultaneously can increase existing vulnerabilities, such as off-time development [7]. Indeed, neighborhood disadvantage amplified the effects of early timing in pan-racial/ethnic samples [6,7]. Ethnically concentrated neighborhoods, however, may represent supportive contexts for Mexican-origin adolescents because norms surrounding traditional views toward parental authority, youth monitoring, positive behaviors, and sexual behavior are promoted in Latino neighborhoods, despite high poverty rates [25,26]. Consistent with this perspective, neighborhood ethnic concentration attenuated the relation between early timing and depression for Mexican-origin girls [4]. Consequently, research on contextual differences among Mexican-origin boys should consider that socioeconomic disadvantage may amplify pubertal timing effects, or ethnic concentration may attenuate them.

Community-based research can effectively differentiate between gonadal and adrenal hormonal signals of physical development [27], and doing so may inform future clinical research [4]. Many community-based studies rely on assessments of global physical changes [16,17] that are initiated and regulated by two related but distinct maturational processes: adrenarche and gonadarche. Adrenal maturation initiates and regulates pubic hair growth and skin changes; gonadal maturation initiates and regulates growth spurts, deepening of voice, and facial hair growth [27]. The global approach undermines the potential for synergies between clinic and community-based research because the former increasingly relies on direct assessments of hormones related to specific maturational processes and documents unique contributions of adrenal and gonadal maturation to internalizing and externalizing symptoms [28–30]. Given that each method has its corresponding strengths and weaknesses, scholars should work to promote synergies across these approaches in an effort to maximally benefit the knowledge base.

We examined whether there were contextual differences in timing effects on internalizing and externalizing symptoms among a diverse sample of Mexican-origin middle school boys. We were well situated to capture timing effects consistent with maturation deviance or developmental readiness because we could detect both early and late timing in middle school. We