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Morningness/Eveningness and Physical Activity in Adolescent Girls: Menarche as a Transition Point

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Abstract

This study identified trajectories of morningness/eveningness and physical activity when chronological (i.e., time since birth) versus gynecological (i.e., time since menarche) age is used to indicate maturation. Piecewise models were fit for girls (N = 262, ages 11–19) using chronological or gynecological age as the time metric. Girls stayed up later (i.e., eveningness) as they approach menarche. After menarche no change in morningness/eveningness was observed. In contrast, no change in morningness/eveningness was detected with chronological age. No change in physical activity was observed before menarche and physical activity declined after menarche. With chronological age, physical activity declined as girls got older. Gynecological age may be more appropriate than chronological age as a metric for understanding changes in morningness/eveningness and physical activity.

Keywords

adolescence; physical activity; morningness/eveningness; menarche

Many biological and psychosocial changes occur during childhood and adolescence; assessment of change inherently requires the identification of time, that is, a time metric. Change may be seen across days, months or years (e.g., years of schooling; Wang, Hill, & Hofkens, 2014), in response to specific events (e.g., educational intervention; Chittleborough, Mittinty, Lawlor, & Lynch, 2014), or with biological maturation (e.g., auditory and visual development; Steinbrink, Zimmer, Lachmann, Dirichs, & Kammer, 2014). The variability in what drives changes in development makes identifying the appropriate time metric challenging, particularly when there is nonlinearity in the phenomenon of interest (Graber & Brooks-Gunn, 1996). Time metrics must therefore be based on theory and hypotheses about the change process, constructs being examined, and mechanisms underlying change, as well as information derived from model estimation itself

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(Grimm, Ram, & Hamagami, 2011). This is important because modeling change ultimately impacts findings in our developmental studies.

There are many instances in which the mechanisms of change for developmental phenomenon – and therefore the appropriate time metric – are either multifaceted or unknown. For example, morningness/eveningness (e.g., a characteristic of humans reflecting the time of day when sleep or awakefullness is preferred; Adan et al., 2012) shifts during adolescence and may coincide with increased vulnerability to risky behaviors (e.g., substance use, antisocial behavior; Negriff, Dorn, Pabst, & Susman, 2011; Susman et al., 2007). This is also true for physical activity, where girls' participation declines across adolescence, leaving them more vulnerable to obesity and adult cardiovascular risks (Williams, 2002). While such changes in morningness/eveningness (M/E) and physical activity are well documented (Bradley, McRitchie, Houts, Nader, & O'Brien, 2011; Petta & Carskadon, 1984), less is known about what drives these changes.

There are several competing hypotheses about why changes in M/E and physical activity occur during adolescence. M/E and physical activity may change because of shifts in psychosocial norms, social roles and values (Kimm et al., 2006; Ohayon, Carskadon, Guilleminault, & Vitiello, 2004). For example, Gradisar and colleagues (2011) found in their review of sleep across adolescence that teens get less sleep because shifts in their chronotype lead them to stay awake later and desire to sleep later, a need that is often not accommodated on school days. Further, Roenneberg and colleagues (2004) reported that eveningness becomes increasingly common into the 20s, followed by a move back to morningness. Similar patterns have been observed with physical activity. Across adolescence, attitudes about physical activity (e.g., consistency with gender norms, lack of time or interest) predict being sedentary above and beyond other adolescent behaviors (e.g., television-watching; Kimm et al., 2006). Drawing from this literature, one might anticipate that the trajectory for physical activity would follow a curvilinear pattern with age, gradually moving toward lower levels of physical activity across adolescence based on chronological age, until eventually reaching a plateau.

Alternatively, it may be that changes in M/E toward eveningness or declines in physical activity occur because of hormonal and biological changes related to puberty (Baker, Birch, Trost, & Davison, 2007; Carskadon, Vieira, & Acebo, 1993; Davison, Werder, Trost, Baker, & Birch, 2007). There is some evidence of a shift toward eveningness for girls showing more advanced pubertal maturation that is not seen in girls with no or few signs of pubertal changes (Carskadon et al., 1993). This shift in M/E has consistently been found to occur around the time of menarche (Frey, Balu, Greusing, Rothen, & Cajochen, 2009). The literature addressing declines in physical activity during adolescence has recently pointed to puberty as a mechanism, with evidence that girls with advanced pubertal status engage in less physical activity than their same-aged peers (Baker et al., 2007). These findings indicate that a model comparing changes in both M/E and physical activity using gynecological age, or time since menarche, as the time metric may be ideal for identifying influences of these developmental changes.

Specifying appropriate time metrics in longitudinal studies is also important because, as mentioned previously, how time is measured can impact our ability to detect effects between covariates and outcomes (Grimm et al., 2011). For example, there have been relatively consistent findings in the associations between depressive symptoms and both physical activity (Paluska & Schwenk, 2000; Sallis, Prochaska, & Taylor, 2000) and M/E (Gau et al., 2007; Kim et al., 2010); similar to M/E and physical activity, depressive symptoms also change during adolescence. Whether change in depressive symptoms is associated with physical maturation (i.e., puberty; Angold, Costello, Erkanli, & Worthman, 1999; Angold, Costello, & Worthman, 1998) or other processes is not clear. How time is specified (i.e., as pre-post menarche, chronological age, time since baseline) in models estimating associations among M/E, depressive symptoms and physical activity contribute to variability in findings and our conclusions about how depressive symptoms relate to M/E or physical activity.

This study sought to examine competing hypotheses regarding whether chronological or gynecological age was more informative for describing sleep preferences and physical activity trajectories. This was accomplished by identifying (a) changes in trajectories of M/E and physical activity among adolescent girls, (b) how trajectories differ depending on chronological age (i.e. time since birth) compared to gynecological age (i.e. time since menarche), and (c) whether the index of development (chronological or gynecological age) influences associations between depressive symptoms and M/E or physical activity. Clarifying whether there are differences in trajectories of M/E or physical activity when chronological and gynecological age are used may assist in understanding the conflicting literature regarding which mechanism of development (chronological age versus gynecological age) drives observed patterns of M/E and physical activity and guide future research and prevention efforts about when to target at-risk girls around issues of sleep habits and physical activity.

Method

Participants

Data were derived from a cross-sequential longitudinal study of healthy adolescent girls (n = 262) designed to examine the impact of substance use and depressive symptoms on reproductive and bone health (Dorn et al., 2013). Girls were enrolled by age cohort (11, 13, 15, and 17 years) and were primarily White (61%) or African American (31%). Socioeconomic status was reported by parents using the Hollingshead Four-Factor Index (Hollingshead, 1975), which can range from 8 to 66 (higher scores indicate higher SES). The sample mean was 37.32 (SD = 13.67), indicating that households of the girls in this study were, on average, headed by caregivers with education and employment levels of skilled craftsmen, clerical, and sales employees. Girls were recruited from the greater Cincinnati area, a large Midwest city comprised of a concentrated urban core surrounded by suburban communities. Retention rates for this longitudinal study were high (90% present for at least two time-points). Of the girls participating, 66% were present at all times of measurement. Between 210 and 262 girls provided data at any given timepoint. Analyses indicated no significant differences in M/E or physical activity at baseline for girls who were present versus those missing at any subsequent time points ($p > .05$). Maximum likelihood estimation was used for all analyses, resulting in the analytic sample size of 262.

Procedures

Healthy girls were recruited from a teen clinic in a large children's hospital and its surrounding community. The study was approved by the Institutional Review Board of the hospital. Parents provided consent and girls provided assent to participate. Annual interviews were conducted at a Clinical Translational Research Center (Time [T]1, T2, and T3) followed by phone interviews three, six, and nine months later, resulting in nine waves of data collection. The first wave of measurement occurred between December 2003 and October 2007 and the final wave of data collection was completed in December 2010. Exclusion criteria at baseline were (1) pregnancy or breastfeeding within 6 months of enrollment, (2) primary (> age 16) or secondary (< 6 cycles per year) amenorrhea, (3) body mass index at or below the first percentile or a weight above 300 pounds, (4) medication or illness that would influence bone density (a focus of the initial study), or (5) psychological disorders that would limit comprehension or compliance.

Measures

Physical activity was assessed using the stem "Have you done the following activities in the past 7 days?" for 25 activities (e.g., basketball, playing outside). Responses ranged from 1 (*Did not do*) to 5 (≥*7 times in past 7 days*) and were averaged, such that higher scores indicated more activity (Crocker, Bailey, Faulkner, Kowalski, & McGrath, 1997). M/E was assessed using the *Morningness/Eveningness Scale for Children*, a 10 item questionnaire with responses ranging from 1 (*minimal morning preference*) to a max of 5 (*maximum morning preference*), such that higher scores indicated a stronger morning preference, with scores ranging from 10 to 43 (Carskadon et al., 1993). The *Physical Activities Questionnaire* and *Morningness/Eveningness Scale for Children* were administered every 3 months for 36 months and a total of 9 timepoints. Age of menarche was reported by girls during clinician interviews. Mean age of menarche was 12.41 years ($SD = 1.25$) and 20% of the sample was pre-menarcheal at baseline. Gynecological age was computed by subtracting age at menarche from the age at the study visit. Body mass index was measured annually using clinician-assessed height and weight with a standardized scale and stadiometer, and percent body fat was obtained from dual energy x-ray absorptiometry annually for 3 years. Depressive symptoms were measured using the Children's Depression Inventory (CDI), a well-established self-report measure of depressive symptoms in children ages 8–17 (Kovacs et al., 1992). The CDI was administered at all annual and 6 month timepoints (i.e., T1, T1.6, T2, T2.6, and T3). Responses to each item on the CDI range from 0 to 2, and participants are asked to consider their experiences in the past 2 weeks. Internal consistency of the CDI ranges from .71 to .89. These analyses used t-scores based on published norms from a non-clinical sample. Using these norms, a score of 50 is considered average, and a score above 65 (1.5 SD above the mean) is considered at-risk for clinical levels of symptoms. In this sample, 5 participants had t-scores above 65 at 1 or more timepoints. Across years of measurement, t-scores in our study had an alpha of .94. Race was coded as two dichotomous variables: a) African-Americans versus European Americans, and b) other minorities and European Americans.

Analytic Plan

A linear growth model was initially fit using chronological age as the timing metric. In these models, age was centered at 12 years, the mean age for menarche. The linear slope was scaled in years (e.g., $y_{tn} = b_{1n} + b_{2n} \cdot (age_{tn} - 12) + e_{tn}$). Additionally, a dichotomous variable was created at each assessment for each individual indicating whether the observation occurred before or after menarche. This variable was included as a time-varying covariate to examine whether the onset of menarche had an effect on the age-based change trajectory. To examine trajectories by gynecological age, a piecewise model was fit, which allows for estimation of a linear slope prior to menarche and a second linear slope after menarche, such that $y_{tn} = b_{1n} + \mathrm{b}_{2n} \cdot min(age_{tn} - menarche_n, 0) + b_{3n} \cdot max(age_{tn} - menarche_n, 0) + e_{tn}$ where b_{1n} is the intercept centered at the age of menarche ($menarche_n$), b_{2n} is the linear slope prior to menarche, b_{3n} is the linear slope after menarche, and e_{tn} is the time-dependent residual. This piecewise model was compared to a linear growth model with gynecological age as the timing metric to determine whether allowing two slopes significantly improved model fit. Unconditional models were initially fit and followed by models that included means of body mass index, percent body fat, and depressive symptoms, as well as race.

Results

Chronological age-based and gynecological age-based models were estimated for physical activity and M/E. Scores for physical activity ranged from 1 to 5, while scores for M/E ranged from 11 to 43, with lower scores indicating eveningness chronotype.

Estimated trajectories for M/E differed by metric of time used. Specifically, the linear growth model using chronological age indicated that M/E did not significantly change, on average, from age 11 to age 20 years. Menarche did not significantly alter the individual age-based trajectory. In the unconditional age-based model, the mean intercept (centered at age 12) was estimated at 26.68 ($p < .01$) indicating M/E did not strongly lean toward either a morning or evening chronotype and there was a non-significant mean slope of 0.03 ($p = .73$) suggesting no mean changes in M/E across adolescence (Figure 1a).

For the gynecological age-based models, the piecewise model fit significantly better than the linear model suggesting that the individual rate of change was altered as a result of menarche. Specifically, prior to menarche there was a negative decline in M/E, with girls staying up later and sleeping later (i.e. eveningness) as menarche approached. After menarche, no change in M/E was observed. For this model, the mean intercept (centered at the age of menarche) was estimated at 26.56 ($p < .01$). Before menarche, girls experienced a significant decline in M/E ($B = -0.76$, $p < .05$) indicating a move from morningness to eveningness as girls approach menarche, on average. After menarche the change in M/E was non-significant ($B = 0.06$, $p = .45$), on average (Figure 1b).

The models for physical activity showed a somewhat different pattern. In chronological age-based models, there was a significant negative average trend indicating that physical activity decreased from 11 to 20 years of age. In this model, the mean intercept was estimated at 3.25 ($p < .01$) indicating a moderate activity level and the mean slope was estimated to be −.

20 ($p < .01$). Accounting for the timing of menarche in the chronological age-based model did not significantly improve model fit suggesting the onset of menarche did not alter the within-person trajectory for the chronological age-based linear growth model (Figure 2a).

For the gynecological age-based models of physical activity, the piecewise model fit significantly better than the linear model suggesting that the individual rate of change was altered as a result of menarche. Specifically, prior to menarche there was no significant change in physical activity; however, after menarche, a significant negative mean slope was observed suggesting a decrease in physical activity post menarche. For this model, the mean intercept (centered at the age of menarche) was estimated at 3.11 ($p < .01$). Before menarche, there was no mean change in physical activity (B = −0.05, $p = .52$). After menarche, the mean change in physical activity was negative and significantly different from zero ($B = -0.19$, $p < .01$; Figure 2b).

To further examine potential differences in models based on time metrics, variables known to co-vary with M/E and physical activity were also included in these models (see tables 1 and 2). This included race, age at menarche (for chronological age only), percent body fat, body mass index, and depressive symptoms. When those covariates were included in these models, there were few associations to note. Higher depressive symptoms were significantly associated with less physical activity and not associated with M/E regardless of time metric used. African-American girls showed more negative changes in physical activities when chronological age was the time metric and also showed more negative changes in physical activity after menarche when the piecewise model was fit. There was also evidence of a stronger shift toward eveningness across time for African-American girls when chronological and gynecological age was used.

Discussion

Taken together, findings indicate that the trajectories for physical activity and M/E vary depending on whether gynecological or chronological age is used as the time metric. It is not appropriate to statistically compare the fit of the growth models when using different time metrics; however, from a substantive point of view, it appears that the models fit using gynecological age may be more consistent with the developmental mechanisms driving change. When slopes were estimated separately before and after onset of menarche, there was evidence of a move toward eveningness orientation (which was not evident when chronological age is used) and no evidence of change in physical activity prior to menarche (which appeared to be decreasing in the model using chronological age as the time metric). The slopes for chronological age mirrored the post menarche slopes, which is likely a result of data density (most observations occurred after menarche).

These findings have substantive importance for M/E in adolescence. Results suggest that, when chronological age is used, there is no change in M/E. However, with gynecological age, there appears to be clear movement toward eveningness only prior to the onset of menses, with no significant change after menarche. This indicates that variability in M/E may be attributable, at least in part, to menarcheal changes not accounted for in many previous studies, which most often considered the role of puberty, as opposed to the use of menarche to determine gynecological age in the current instance, in shaping M/E and sleep patterns (Baker et al., 2007; Carskadon et al., 1993; Davison et al., 2007; Frey et al., 2009). Of note, the current findings are consistent with Carskadon's previous work, which suggested movement toward eveningness when girls were showing signs of pubertal changes and the strongest evening preference among girls with the greatest pubertal changes – all of whom had also experienced onset of menses. While the underlying cause of pre- versus post-menarcheal shifts in M/E needs to be examined, it is possible that estrogen plays an activational role in altering M/E (Manber & Armitage, 1999). Recent work by Igarashi and colleagues (2015) suggests that estradiol influences sleep/wake cycles and patterns of sleep behavior in female rats, consistent with the current findings. Likewise, Schwartz and Mong (2013) reported evidence that estradiol acts as a mechanism to regulate sleep in rats.

Our M/E findings may also extend to research suggesting that sleep and wake times shift on week-nights and week-ends, such that teens get less sleep on week-nights (Gradisar et al., 2011), and that there is a strong shift toward eveningness across ages 11–20, followed by a peak and shift toward morningness across the remainder of the lifespan (Roenneberg et al., 2004). Inconsistencies between our findings and Roenneberg's work, which suggested declines in sleep across adolescence (in contrast to our findings that declines in M/E occur only before menarche), likely result from two sources: First, our data represents within-person, rather than between-person shifts, using repeated measures; thus, our slope reflects how individuals, rather than populations, are changing. Second, Carskadon and colleague's (1993) measure, which was used in the current study, is designed specifically for teens and indicates preferences, and not actual daily experiences, as Roennenberg's (2004) measure reflects. It is worth noting that while we detected no change in M/E post-menarche, the estimates at those timepoints favored evening orientation. Further, it may be that many of these teens were experiencing a mis-alignment of M/E and the social demands of the world teens live in (particularly during the school-year), which would alter when they preferred to sleep and number of hours slept. The M/E measure used in this study does not allow us to examine mechanisms; future studies are needed to further explain the mechanism causing these findings.

With regard to physical activity, our findings again suggest that menarcheal changes are important to consider when examining trajectories, extending previous research on the impact of puberty on physical activity (Baker et al., 2007). Our findings indicated a decline in physical activity with age, and that the onset of decline appears to coincide with menarche. While our study was not designed to account for the impact of estradiol on physical activity, there appear to be some similarities between the pattern we found with respect to menarche and the separate literature examining hormones and physical activity. Specifically, estradiol is known to increase throughout puberty in girls with the highest estradiol levels observed in the later stages of puberty (although in a cyclical fashion; Garcia-Mayor et al., 1997); menarche often coincides with later stages of puberty (Martí-Henneberg & Vizmanos, 1997). In non-human primates, physical activity increases in the luteal phase (when estradiol levels are lower) compared to the periovulatory phase (when estradiol levels are the highest; Nyakudya, Fuller, Meyer, Maloney, & Mitchell, 2012). Likewise, in their review of the literature Balzer and colleagues (2015) concluded that a rise in estradiol during adolescence is associated with altered behavior. More research to understand these endocrine mechanisms as they relate to physical activity is warranted.

Our finding may also offer insight as researchers grapple with how to assess metrics of change in their research, potentially beyond application to physical activity or M/E. In this study we used gynecological age, rather than other measures of puberty (e.g., Tanner stage, pubertal timing) – how to best include measures of puberty in future studies, including when and how various measures of puberty are most meaningful for phenomenon of interest, is clearly an important consideration (Dorn, 2006). Of note, menarche is a part of the pubertal process but puberty and menarche are not synonyms. Therefore, thoughtful consideration of these findings and comparisons with other studies using different measures of puberty is essential, as other various indices of puberty capture different aspects of reproductive development.

Replication of this study should be conducted with larger sample sizes, along with inclusion of additional markers of menarche (e.g., phase of the menstrual cycle, hormone levels) or other markers of puberty (e.g., Tanner staging) and adolescents from other socio-cultural backgrounds in order to enhance generalization. Further, it was not clear whether these findings would replicate with a larger sample of premenarcheal girls or with models estimated starting earlier than age 11. Although we included available control variables when they were theoretically relevant, it may be that an unmeasured confound is contributing to these findings. Finally, our study only included girls; the inclusion of boys is an important area for future research, particularly because of challenges in assessing pubertal development with males (Coleman & Coleman, 2002); particularly with a measure comparable to menarche. Better understanding of the manifestation of these trajectories in boys could be highly informative given the known sex differences identified in both sleep (Roenneberg et al., 2004) and physical activity (Sallis, Zakarian, Hovell, & Hofstetter, 1996).

In spite of these limitations, our findings reiterate the importance of specifying time metrics accurately in longitudinal studies examining change. Time metrics chosen should reflect the underlying mechanisms hypothesized to drive changes in the phenomenon of interest. In the case of physical activity and M/E, it appears that gynecological age, or time oriented to menarche, is a more appropriate metric than using chronological age, or time oriented to date of birth. Future studies examining potential alternative time metrics in longitudinal studies, beyond the use of chronological age or time since the first wave of data collection, should replicate and expand on our finding.

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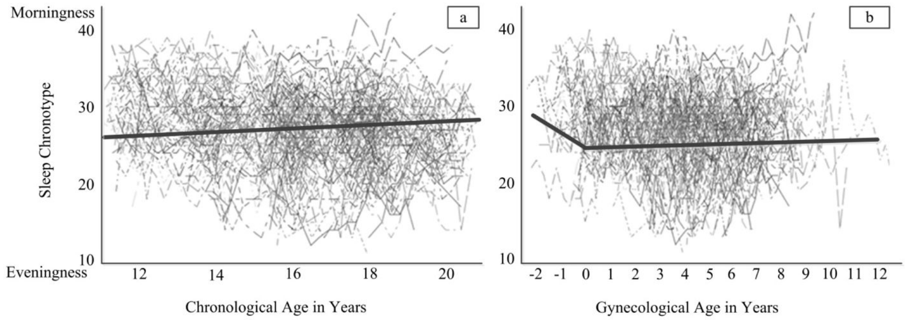

Figure 1.

Trajectories of Morningness-Eveningness (M/E) when chronological age (i.e., years since birth, left) and gynecological age (i.e., years since age at menarche, right) are used. Higher values for M/E represent a morningness orientation. Negative values for gynecological age represent time prior to menarche.

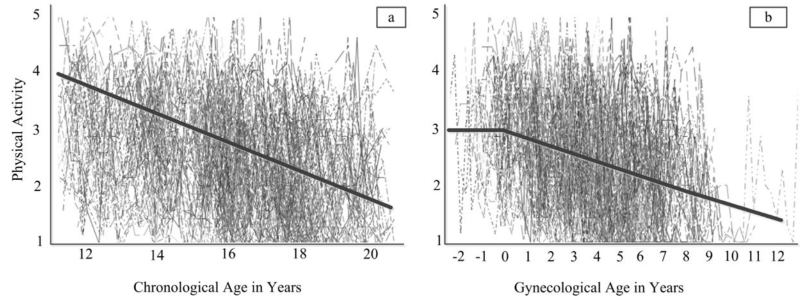

Figure 2.

Trajectories of physical activity (i.e., bouts of moderate to vigorous activity per week) when chronological age (i.e., years since birth, left; a) and gynecological age (i.e., pre or post-menarche, right; b) are used. Negative values for gynecological age represent time prior to menarche.

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Table 1

Relations among Covariates, Chronological and Gynecological Age on Morningness/Eveningness

	Chronological Age			Gynecological Age		
Effect	**Estimate**	**Error**	**95% CI**	**Estimate**	**Error**	**95% CI**
Intercept	35.49**	5.63	24.40 – 46.58	30.31**	1.72	26.92 – 33.70
Chronological Age	−1.00	1.02	−3.01 – 1.01	---	---	---
Menarche	−0.37	0.39	−1.13 – 0.40	---	---	---
Pre-menarche	---	---	---	−0.83**	0.27	−1.36 – −0.30
Post-menarche	---	---	---	−0.40	0.34	−1.07 – 0.27
Black (Race/ethnicity)	0.81	1.08	−1.32 – 2.94	0.90	0.96	−0.99 – 2.79
Other (Race/ethnicity)	1.61	1.81	−1.96 – 5.17	1.13	1.65	−2.12 – 4.38
Time*Menarche	0.08	0.12	−0.16 – 0.31	0.05	0.11	−0.17 – 0.27
Time*Black	−0.34**	0.08	−0.50 – −0.18	−0.30**	0.08	0.14 – 0.46
Time*Other	−0.20	0.15	−0.50 – 0.10	−0.15	0.14	−0.43 – 0.13
Between Person Percent Body Fat	0.03	0.07	−0.11 – 0.17	0.05	0.11	−0.17 – 0.27
Between Person Depressive Symptoms	0.16	0.20	−0.23 – 0.55	0.14	0.19	−0.23 – 0.51
Time*Between Person Percent Body Fat	−0.24	0.34	−0.91 – 0.43	−0.16	0.34	−0.83 – 0.51
Time*Between Person Depressive Symptoms	−0.01	0.02	−0.05 – 0.03	0.00	0.02	−0.04 – 0.04
Within Person Percent Body Fat	0.00	0.02	−0.04 – 0.04	−0.01	0.02	−0.05 – 0.03
Within Person Depressive Symptoms	0.03	0.03	−0.03 – 0.08	0.02	0.03	−0.04 – 0.08

* $p < .05$;

** $p < .01$

Table 2

Impact of Covariates, Chronological and Gynecological Age on Physical Activity

	Chronological Age			Gynecological Age		
Effect	**Estimate**	**Error**	**95% CI**	**Estimate**	**Error**	**95% CI**
Intercept	3.92**	1.03	1.89 – 5.95	3.28**	0.30	2.69 – 3.87
Age	−0.26	0.20	−0.65 – 0.13	---	---	---
Menarche	−0.03	0.07	−1.17 – 0.11	---	---	---
Pre-menarche	---	---	---	−0.06	0.08	−.22 – 0.10
Post-menarche	---	---	---	−0.21**	0.06	−0.33 – −0.09
Black (Race/ethnicity)	0.19	0.19	−0.18 – 0.56	0.27	0.17	−0.06 – 0.60
Other (Race/ethnicity)	−0.02	0.31	−0.63 – 0.59	−0.13	0.28	−0.68 – 0.42
Age*Menarche	−0.02	0.02	−0.06 – 0.02	−0.01	0.02	−0.05 – 0.03
Age*Black	−0.04**	0.01	−0.06 – −0.02	−0.03*	0.01	−0.05 – −0.01
Age*Other	0.02	0.03	−0.04 – 0.08	0.01	0.02	−0.03 – 0.05
Between Person % Body Fat	0.01	0.01	−0.01 – 0.02	−0.01	0.02	−0.05 – .03
Between Person Depressive Symptoms	−0.09**	0.04	−0.17 – −0.01	−0.09**	0.04	−0.17 – −0.01
Age*Between Person % Body Fat	−0.09	0.07	−0.23 – 0.05	−0.06	0.06	−0.18 – 0.06
Age*Between Person Depressive Symptoms	0.00	0.00	−0.00 – 0.00	0.00	0.00	−0.00 – 0.00
Within Person Percent Body Fat	0.00	0.00	−0.00 – 0.00	0.00	0.00	−0.00 – 0.00
Within Person Depressive Symptoms	0.00	0.01	−0.02 – 0.02	0.00	0.01	−0.02 – 0.02

* $p < .05$;

** $p < .01$