

Remote acculturation and physical activity among adolescent-mother dyads in Jamaica:

A developmental dyadic moderation

Sarah Gillespie,<sup>1</sup> Lauren Eales,<sup>1</sup> Dalicia D. Simpson,<sup>1</sup> and Gail M. Ferguson<sup>1</sup>

<sup>1</sup> Institute of Child Development, University of Minnesota

### **Author Note**

Correspondence concerning this article should be addressed to Sarah Gillespie, Institute of Child Development at the University of Minnesota, 51 E River Rd, Minneapolis, MN 55455.

Email gille597@umn.edu

The Culture, Health, and Family Life Study, on which this paper is based, was partially funded by an International Seed Grant awarded to Dr. Gail M. Ferguson (PI) from the College of Agriculture, Consumer, and Environmental Sciences at the University of Illinois at Urbana-Champaign. Preparation of this manuscript was funded by the Provost Fellowship from the University of Minnesota and a National Science Foundation Graduate Research Fellowship to the first author and a National Institute of Mental Health T32 Fellowship for the second author. The authors gratefully acknowledge the students and staff at the participating schools in Jamaica, research assistants on this project, and collaborators on the larger study. The content is solely the responsibility of the authors and does not necessarily represent the official views of the funding institutions.

### **Citation and Copyright**

Gillespie, S., Eales, L., Simpson, D., & Ferguson, G. M. (2022). Remote acculturation and physical activity among adolescent-mother dyads in Jamaica: A developmental dyadic moderation. *Journal of Cross-Cultural Psychology*, 53(6), 643-658. doi:10.1177/00220221221101172

Note. This is the author copy of the accepted manuscript. Therefore, this paper does not exactly represent the authoritative document published in the *Journal of Cross-Cultural Psychology* (reference above).

### Abstract

This study examined the associations between remote acculturation to European American culture, hereafter United States (U.S.) American culture, and physical activity levels among Jamaican mother-adolescent dyads. Remote acculturation, a modern type of globalization-facilitated acculturation to a distant non-native culture, is a demonstrated risk factor for some health outcomes, but the association with physical activity has not previously been examined. Mothers and adolescents (N = 660; 330 dyads) were recruited from schools in Kingston, Jamaica. Actor-Partner Interdependence Moderation Models tested hypotheses about actor and partner effects of U.S. cultural orientation on moderate and vigorous physical activity (MVPA), and the moderation of these effects by developmental stage, socioeconomic status (SES), and gender. We observed a contrast pattern of moderation, such that the signs of the actor and partner effects depended on adolescent developmental stage. The actor effect of adolescents' U.S. orientation on their own MVPA was negative for early adolescents (unexpected) and positive for mid-adolescents (expected); by contrast, the partner effect of mother's U.S. orientation on adolescents' MVPA was positive for early adolescents (expected) and negative for mid-adolescents (unexpected). SES and gender did not moderate the associations. This study contributes to an emerging body of literature on the health correlates of remote acculturation. Our results suggest that whether remote cultural orientation is a risk or protective factor varies based on the health domain in question, developmental stage, the remote culture, and the context.

*Keywords:* Adolescence, Remote Acculturation, Physical Activity, Actor Partner Interdependence Model, Jamaican/Caribbean

**Remote acculturation and physical activity among adolescent-mother dyads in Jamaica:  
A developmental dyadic moderation**

For youth aged 5 to 19 years old, the overweight and obesity rate has reached epidemic proportions, increasing from 4% in 1975 to 18% in 2016– meaning that approximately 340 million children are considered overweight or obese (World Health Organization, 2020). Along with diet, a major modifiable contributor to obesity is *physical inactivity* – and, conversely, one solution to global obesity specified by the World Health Organization (WHO) is increasing physical activity. It is particularly important to understand influences on physical activity during adolescence, given a well-documented decline in physical activity levels during this stage of development (Dumith et al., 2011), which coincides with pubertal changes and shifting motivations for physical activity (Labbrozzi et al., 2013).

Today, adolescents are developing their health habits and being parented in the context of 21<sup>st</sup> century globalization wherein media and technology bring a plethora of remote cultural influences to their fingertips alongside local influences regarding health habits. *Remote acculturation* (Ferguson & Bornstein, 2012) is a modern type of globalization-facilitated acculturation common among adolescents and some parents that occurs through indirect and/or intermittent exposure to a distant non-native culture (see review by Eales et al., 2020). A growing body of applied research among international youth and parents has linked remote orientation to U.S. American (henceforth U.S.) culture to indicators of health and well-being, including nutrition (Jamaica: Ferguson et al., 2018), smoking (Mexico: Lorenzo-Blanco et al., 2019), and psychological health (South Africa: Ferguson & Adams, 2016).

The present study will be the first to consider the association between remote U.S. orientation and physical activity, as well as developmental, family, and contextual moderators of

this relation. Investigations of cultural and contextual influences on physical activity should account for normative changes in motivations for physical activity during adolescence and into adulthood. For example, media representation of body image ideals, such as those disseminated through globalization (O'Garro et al., 2019), may be an increasingly relevant factor influencing the physical activity levels of older adolescents and adults. Additionally, families provide both instrumental and psychological support for physical activity, making them an important context for understanding the physical activity of adolescents and parents (de la Haye et al., 2014). A deeper understanding of dyadic and cultural influences over the course of development may identify adolescents and parents who are more at risk for declines in physical activity levels and highlight protective factors to leverage in health promotion interventions.

### **Physical Activity in Jamaican and U.S. Cultures**

Jamaica is a prime case study for how remote acculturation relates to elements of physical health. The study of remote acculturation originated in Jamaica, an English-speaking country with multiple connections to the United States via trade, transnational families, technology including media exposure, and tourism (4Ts of remote acculturation vehicles: Eales et al., 2020).

#### ***Physical Activity in Jamaican Culture***

Across sports as diverse as bobsledding, soccer, and track and field, Jamaican athletes and teams have attained marked international success on the world stage over the past century (Grant & Lawrence, 2012). However, the Jamaican Ministry of Health and Wellness reports that only 18% of Jamaicans meet the World Health Organizations minimum recommendations for physical activity (Jamaican Ministry of Health & Wellness, 2018). Collectively, this suggests

that national pride in star athletes may not have resulted in physical activity becoming an integral part of mainstream Jamaican identity or behavior.

### *Globalization of U.S. Fitness Culture*

Modern U.S. fitness culture—encompassing Western body ideals and prescribing specific and gendered activities to attain them—has become a global industry worth over \$94 billion in 2019 (IHRSA Global Report, 2020). The body ideals and specific practices associated with globalizing fitness culture may be communicated to adolescents and mothers in Jamaica through portrayals of fitness culture via the Ts of remote acculturation: in U.S. media (i.e., technology), the commercialization of gyms and fitness culture (i.e., trade), as well as through the observations of tourist exercise habits (i.e., tourism). Recently, O’Garro and colleagues (2019) reported that some undergraduate students in Jamaica have internalized Western beauty ideals, which was associated with poorer mental health.

U.S. cable TV and advertisements are very common in Jamaican homes, making media an important driver of remote acculturation in Jamaica (Ferguson, 2013). The content and messaging about physical activity in television programs is, therefore, relevant to understanding how orientation to U.S. culture may relate to physical activity levels. Although there are high rates of obesity and sedentary behavior in the United States, actors and television personalities in U.S. media are disproportionately thin and toned (Robinson et al., 2008), and U.S. television programs that specifically depict weight loss may highlight physical activity as the main strategy for controlling body weight, while underrepresenting the role of diet (Klos et al., 2015). A recent content analysis of four programs targeting adolescent audiences found that physical activity was portrayed in half of the programs studied, and it was generally depicted as a positive activity motivated by enjoyment (O’Reilly-Duff et al., 2018). Simultaneously, TV shows often include

incidents of weight stigmatization (Eisenberg et al., 2015) and overweight cartoon characters are more than twice as likely to be shown exercising (Robinson et al., 2008). Broadly, this literature suggests that U.S. fitness culture—particularly as it may be conveyed to remotely acculturating adolescents and mothers via media—prescribes physical activity as a strategy for fulfilling individual responsibilities to cultivate health and body shape.

### **Developmental and Contextual Influences on Remote Acculturation and Physical Activity**

The association of U.S. orientation with physical activity among remotely acculturating adolescents may be moderated by developmental and contextual factors. Research with U.S. adolescents suggests that the emphasis on body ideals in U.S. fitness culture may be increasingly salient for older adolescents, relative to early adolescents (Gavin et al., 2014). Furthermore, early adolescents may be more dependent on family support of physical activity (Edwardson & Gorely, 2010), making the influence of the mother's U.S. orientation and beliefs about autonomy, self-expression, and family obligations more salient determinants of early adolescents' physical activity. Meanwhile, older adolescents may have more freedom and autonomy to act on their cultural orientation towards fitness. Finally, older adolescents will have been exposed to a larger overall volume of U.S. media (lifetime exposure and possibly also daily media allowances), potentially amplifying any influence of their adopted secondary U.S. cultural identity on physical activity.

Socioeconomic status (SES) may constrain the ways in which individuals may act on their cultural orientation. In Kingston, Jamaica, the setting of our study, high income students and mothers may be able to afford domestic help, freeing leisure time during which they may express their cultural values around physical activity. High income youth may be driven to school, whereas lower income students, who often commute via public transportation, may gain

more incidental physical activity by walking to/from bus stops, but may have less leisure time for engaging in moderate or vigorous exercise.

Finally, the adolescent's gender may play a moderating role in the reciprocal or dyadic influences on physical activity. Dyadic research on remote acculturation in Jamaica has found that mothers' U.S. cultural orientation predicts the diet of their daughters (through the mediator of U.S. cable TV consumption), but not of their sons (Ferguson et al., 2018). Consequently, it is important to consider child gender when investigating these effects within mother-adolescent dyads in Jamaica. Overall, methods that capture these developmental, gender, and contextual influences on physical activity in the context of dyadic relationships can identify which individuals and families may be at greatest greater risk for inactivity as well as show how interventions could leverage these dyadic relationships to promote physical activity among both partners (de Heer et al., 2017).

### **The Present Study and Hypotheses**

The present study aims to investigate the association between cultural orientation and moderate and vigorous physical activity (MVPA), as moderated by developmental and contextual factors among adolescent-mother dyads recruited from secondary schools in Jamaica. We pre-registered several hypotheses as well as our analytic plan, which describe our use of actor-partner interdependence moderation models (APIMoM; Cook & Kenny, 2005; Garcia et al., 2015) to investigate our three research questions. In APIMoM, the relation between one dyad member's independent/exogenous and dependent/endogenous variables is called an "actor effect", while the relation between one dyad member's independent variable and the other member's dependent variable is called a "partner effect." In other words, APIMoM allows for simultaneous modeling of both individual (actor) and dyadic (partner) effects, which are highly

relevant for understanding the family context that promotes or suppresses physical activity among adolescents and parents (de la Haye et al., 2014). In the description of our models, we adopt the APIMoM convention of describing relations between exogenous and endogenous variables as actor or partner “effects” (Garcia et al., 2015), but it should be noted that the cross-sectional nature of our design precludes causal or directional claims.

First, we will report which factors (e.g., media, parents, friends) are perceived to influence the motivation to engage in MVPA in our sample. We will also examine associations between SES and MVPA levels for youth and mothers in Jamaica. We hypothesize (1) that family SES will be positively correlated with mothers’ and adolescents’ MVPA, but negatively or less strongly correlated with low intensity activities such as walking.

Second, we will examine the actor effects of an individual’s own cultural orientation on their physical activity levels, as well as moderators of that relation. We hypothesize (2a) that there will be a weak or non-significant correlation between Jamaican orientation and MVPA. We also hypothesize that there will be a positive actor effect of U.S. orientation on MVPA, which will be moderated by (2b) developmental stage such that older adolescents will show a stronger relation, and (2c) family SES such that higher SES will be associated with a stronger effect.

Finally, we will examine partner effects between members of the dyad. We hypothesize (3a) that adolescents’ U.S. orientation will predict higher MVPA of mothers (partner effect), with this effect being stronger among mother-daughter than mother-son dyads. We further hypothesize that mother’s U.S. orientation will have partner effects on the adolescent’s MVPA (3b), which will be stronger for early adolescents and for mother-daughter dyads.



## Methods

### Participants

Altogether, 366 adolescents and 365 mothers were recruited from three government run, public high schools in Kingston, Jamaica (45% response rate), and 330 adolescent-mother dyads ( $M_{\text{adolescent\_age}} = 13.8$ ,  $SD = 1.8$ , 64% girls;  $M_{\text{mother\_age}} = 41.4$ ,  $SD = 7.8$ ) were maintained in the analytic sample. Starting with the families represented by the 365 mothers, we excluded 5 mothers whose adolescents did not complete surveys; 27 dyads where either the mother or the adolescent had more than 20% of data missing, two dyads of twins and their mothers, and one dyad where the mother lived more than half of her life outside of Jamaica. Following these exclusions, mother-child dyads did not include any sibling pairs. There were 170 early-adolescents in 7th and 8th grades ( $M_{\text{age}} = 12.27$ , Range age = 11–14,  $SD=.74$ ) and 160 mid-adolescents in 10th and 11th grades ( $M_{\text{age}} = 15.45$ , Range age = 14–18,  $SD=.81$ ). The mothers reported on the educational levels of the primary household earners. The distribution of educational levels in this sample was 40% secondary school education or below and 36% with technical/vocational training or some college, and 24% with a bachelor's or professional degree (scale adapted from Hollingshead, 1975).

### Procedure

Data are drawn from a larger study of mother-adolescent dyads in Jamaica: The Culture, Health, and Family Life Study, which aims to understand remote cultural influences on health and identity development in the context of 21<sup>st</sup> century globalization. Following Institutional Review Board approval in Jamaica and the United States, adolescents in the stated grades were randomly selected to take home envelopes containing a mother questionnaire and consent form along with a prelabeled envelope to return documents confidentially to their school that

week. Students were given a student questionnaire to fill out after school only if they returned a signed parental consent form, mother questionnaire, and student assent form. Students filled these questionnaires out in designated rooms where research team members could answer questions. Participants received prepaid phone credit for their participation.

### **Measures**

Gender, grade in school, and family SES were gathered. Grade was dichotomized into early adolescent (grade 7 – 8) and mid-adolescent (grade 10-11). These divisions reflect the structure of the Jamaican school system, in which these grades are often grouped into “lower school” versus “upper school” cohorts (e.g., different vice principals).

The Jamaican Youth Risk and Resiliency Behaviour Survey (Wilks et al., 2007), which was developed for use in Jamaica, was used to measure the family SES. Mothers reported whether their family owns items from a list of 16 key possessions including vehicles and appliances. For each additional car the family owns, another point was added to the number of possessions (range = 0 – 16, 79.1% of adolescents reported having 6+ possessions).

### ***Physical Activity***

A slightly adapted version of the International Physical Activity Questionnaire – Short Form (IPAQ-SF) was used to assess physical activity of both mothers and adolescents (Booth, 2000; Craig et al., 2003). Minor adaptations involved changing the explanations and sample activities to be more relevant to Jamaican adolescents and mothers. Participants were asked how many *days* in a typical 7-day week they spend doing vigorous physical activities (e.g., aerobics, fast bicycling), moderate physical activities (e.g., bicycling at a regular pace), and walking for at least 10 minutes at a time. Participants then reported how much *time* they typically spent doing moderate or vigorous physical activity or walking each day that they exercised during a typical

week. The MVPA score was the number of hours spent doing moderate or vigorous activity in a typical week: (vigorous activity days x minutes + moderate activity days x minutes) / 60. The walking score was the number of hours spent walking in a typical week: (days x minutes) / 60.

### *Perceived Influences on Physical Activity*

Mothers and adolescents both reported on influences on their physical activity level via a checklist. After being asked, “What influences your physical activity level?” participants chose from a list of possibilities (Y/N), including “weight,” “to look good,” “parents,” and “desire/enjoyment” (see Table 1).

### *Remote Acculturation*

**Identity.** An adapted version of the Identity Acculturation subscale of the Language, Identity and Behavioral Acculturation Scale was used to assess the degree of cultural orientation bidimensionally in terms of Jamaican and U.S. cultural identity (LIB; Birman & Trickett, 2001). The Identity Acculturation subscales, originally derived from the Multidimensional Scale for Latinos (Birman & Zea, 1996) and further adapted (Birman & Trickett, 2001) assess both the degree of identification with each target culture and the extent to which participants view this identification positively. The U.S. orientation subscale remained identical, while the Russian subscale was adapted to measure Jamaican orientation, resulting in the U.S. subscale and Jamaican subscale containing 4 items each. Sample items include “I consider myself American / I consider myself Jamaican” and “I am proud to be an American / I am proud to be Jamaican.” Item ratings were made on a 4-point Likert-type scale ranging from “not at all” to “very much.” In this sample, the reliability of the subscales was acceptable for adolescents (Jamaican  $\alpha = 0.88$ ; U.S.  $\alpha = 0.89$ ) and for parents (Jamaican  $\alpha = 0.78$ ; U.S.  $\alpha = 0.91$ ).

**Behavior.** Short versions of the European American Orientation subscale (so named because of the European ancestry of most White Americans and influences on that culture) and Jamaican Orientation subscale of the Acculturation Rating Scale Jamaican Americans (ARSJA; Ferguson et al., 2012) were used to measure media enjoyment and behaviors associated with each culture. This measure has been used to examine bi- and tri-culturalism among Jamaican-origin youth (Ferguson et al., 2012; Ferguson & Bornstein, 2015). As utilized in Ferguson and colleagues' (2018) original investigation of the health correlates of remote acculturation, the European American (EA) Orientation subscale is three items of the original nine from the ASRJA that capture media enjoyment. Items were derived from a full information adaptive factor analysis, in which the three items related to U.S. media enjoyment loaded onto identical factors for mothers and adolescents and had acceptable internal consistency. Given that this is a study with dyadic data analyses, having identical factors for both adolescents and mothers is critical to ensure measurement invariance (see Ferguson et al., 2018 for more details). Furthermore, media is the primary vehicle of remote acculturation among Jamaican adolescents (Ferguson & Bornstein, 2015); thus, this brief scale reduced participant burden and captured the most salient behavior linked to remote U.S. cultural orientation in Jamaica.

The Jamaican Orientation subscale used contained 11 items of the original 16 from the ARSJA. Participants reported their level of agreement with statements asking both about behavior (e.g., entertainment and food preferences, language use) and cultural identification (i.e., degree of parents' identification with Jamaican culture). Additional items were retained on this scale relative to the EA/U.S. orientation scale to capture the broader range of culturally-oriented behaviors afforded by living in Jamaica. Items on all subscales were rated on a 5-point Likert scale from 1 ("none or not at all") to 5 ("very much or always"). The reliability of the subscales

was acceptable for adolescents (Jamaican subscale  $\alpha = 0.77$ ; EA/U.S. subscale  $\alpha = 0.73$ ) and for mothers (Jamaican subscale  $\alpha = 0.72$ ; EA/U.S. subscale  $\alpha = 0.77$ ). Due to the small number of items in the EA subscale, we report the average inter-item correlations as well: mothers = .54; adolescents = .47.

**Composite remote acculturation score.** To capture both identity and behavioral domains of U.S. orientation, we created a composite score from the European American Orientation subscales of the ARSJA and the American Identity Acculturation of the LIB by fitting a 2<sup>nd</sup> order confirmatory factor model. Latent variables were estimated from the indicators of each scale respectively (e.g., behavior, identity). The identity models had fair fit (CFI = 0.91, RMSEA = 0.15), while the behavior model had good fit (CFI = 0.99, RMSEA = 0.04). Next, those latent variables were treated as indicators of the single latent construct (e.g., U.S. orientation). This model obtained good fit for mothers and adolescents ( $\chi^2/df = 2.2$ , CFI = 0.96, RMSEA = 0.06); metric invariance was examined by constraining items to load equally onto latent factors across mothers and daughters. These additional constraints resulted in a significant decrement of fit according to a Chi-square difference test, but the constrained model still had acceptable fit ( $\chi^2/df = 2.4$ , CFI = 0.95, RMSEA = 0.07), and the change in CFI (-0.01) and RMSEA (0.01) are within the accepted limits (Putnick & Bornstein, 2016). Scalar invariance was not supported (significant Chi-square difference test and large CFI and RMSEA changes), thus there is partial evidence for metric invariance between mothers and daughters on the remote acculturation measure. Predicted scores from this 2<sup>nd</sup> order CFA model were used in subsequent analyses.

### **Plan of Analysis**

To answer our first research question, we report perceived influences on physical activity according to developmental stage and gender, and computed correlations among walking, MVPA, and family SES. To answer our second research question, correlations between the Jamaican identity and behavioral acculturation scales and MVPA were computed. For the remainder of our second and our third research questions further analyses were conducted. First, APIMoM models with distinguishable partners (e.g., adolescent vs. mother) were fit to examine direct actor and partner relations. Second, following our pre-registered plan and the recommendations of Garcia et al. (2015), we tested for moderation of the actor and partner effects by developmental stage and SES using APIMoM models. Finally, we tested for moderation of the partner effects via gender using multigroup SEM. Acceptable fit was pre-defined as: CFI > .90, TLI > .90, RMSEA < .06–.08 (Byrne, 2010; Hu & Bentler, 1999; Kline, 2011), and  $\chi^2/df < 3$  (Byrne, 2010). High right skew in the MVPA variable was corrected via log transformation.

## Results

### Contextual Influences on Physical Activity

Table 1 displays the factors that adolescents and mothers perceived as influencing their physical activity. Notably, almost half of the sample (71.8% of mothers and 23.0% of adolescents) reported that media and advertisements influence their physical activity levels. For adolescents, health was the primary influence on physical activity, followed by desire and enjoyment. Early adolescent boys and girls were more likely than mid-adolescents to say that parents influenced their physical activity. Girls were more likely to say that looking good was a motivator. Overall, less than half of the sample met Jamaican Ministry of Health and Wellness Guidelines for physical activity. Early adolescent girls were the least likely to meet the

guidelines, while mid-adolescent boys were the most likely (Table 1). Consistent with our hypothesis, SES was not correlated with walking. Contrary to our hypothesis, SES was not correlated with higher MVPA (Table 2).

### **Cultural Orientation and Physical Activity**

Consistent with our hypothesis, Jamaican identity (measured with the LIB) and behavior (EAOS-ARSJA) were not correlated with higher levels of MVPA for adolescents or mothers (Table 2). Mother's U.S. orientation composite was positively correlated with MVPA.

Controlling for the significant covariate of developmental stage ( $\beta = 0.29, p = 0.02$ ), the baseline APIM model using the composite of U.S. orientation to predict MVPA demonstrated excellent fit ( $\chi^2/df = 0.33, CFI = 1; RMSEA = 0$ ). U.S. orientation did not show significant actor or partner effects on adolescents' or mothers' MVPA.

### **Moderation by Developmental Stage, SES, and Gender**

All models use the composite variable as a measure of remote identity and behavioral orientation to U.S. culture. We established a baseline APIMoM model that included all actor (one's own U.S. orientation predicting one's own MVPA) and partner effects (one's own U.S. orientation predicting their partner's MVPA), as well as four simultaneous moderation effects (the moderator interacting with each actor and partner effect). To test moderation, this baseline model in which moderation effects were freely estimated was compared to one in which the effects of the moderator were constrained to 0. For the moderator of developmental stage, the moderated model had excellent fit ( $\chi^2/df = 0.33, CFI = 1; RMSEA = 0$ ). However, the addition of the moderator did not significantly improve the fit of the model versus the constrained model according to a likelihood ratio test ( $\chi^2(4) = 4.47, p = 0.35$ ). Moderation paths were marginally significant, but of moderate size, for the interaction between developmental stage and

adolescents' actor effect ( $\beta = 0.35, p = 0.061$ ) and the partner effect of mothers ( $\beta = -0.37, p = 0.058$ ) on adolescents' MVPA.

To further probe these trending effects, we then conducted alternate analyses to go beyond our pre-registered analyses by running a “trimmed” model in which the moderation effects only predicted youth's MVPA; we removed the paths predicting mother's MVPA, about which we did not have specific hypotheses. The Garcia et al. (2015) APIMoM method is a very stringent method; however, APIMoM has been successfully performed with this alternate “trimmed” model in prior studies (Faro et al., 2018). Our trimmed model had excellent fit ( $\chi^2/df = 0.356, CFI = 1; RMSEA = 0$ ) and the interaction terms of U.S. orientation (mother and adolescent) with the adolescents' developmental stage were statistically significant for the effect of the mother's cultural orientation on the adolescent's MVPA ( $\beta = -0.38, p = 0.04$ ) and marginally significant for the effect of the adolescent's cultural orientation on their own MVPA ( $\beta = 0.35, p = 0.05$ ). The 0.35-0.38 standard deviation increase in MVPA associated with a one unit increase in U.S. orientation is equivalent to 64-70 extra minutes of exercise, respectively.

Regarding the developmental moderation, both models (the pre-registered full model and the alternate trimmed model testing just the adolescent effects) indicated that the actor effect of adolescent's U.S. orientation on their MVPA is negative for early adolescents but positive for mid-adolescents (Figures 1 and 2). Conversely, the partner effect of the mother's U.S. orientation on the adolescent's MVPA is positive for early adolescents, but negative for mid-adolescents. These effects are consistent with a *contrast pattern* of moderation (see Garcia et al., 2015).

Adding SES as a moderator to the baseline model did not significantly improve model fit over a model in which moderating paths were constrained to 0 ( $\chi^2(4) = 0.28, p = 0.99$ ). This was true when adding SES to a model that included the developmental paths. Finally, the moderation



by gender of the partner effects was tested using multigroup SEM, with and without the developmental moderation paths. According to a series of likelihood ratio tests, constraining the partner effects of the mother and youth across genders did not result in a significant decrement of fit, indicating that gender does not moderate these relations.

### **Discussion**

The goal of this study was to investigate the cultural, contextual, and developmental factors associated with physical activity among Jamaican mother-adolescent dyads who are remotely acculturating due to exposure to U.S. culture through modern globalization. The descriptive findings of perceived influences on physical activity point to the importance of understanding the ways in which media and technology may influence physical activity, particularly among remotely acculturating individuals who may receive messages about physical activity and other health behaviors from both local and remote sources. These preliminary results highlight the potential value of applying a developmental lens to understand and leverage changing influences on physical activity over the life course to promote the development and maintenance of health behaviors.

Taken together, findings from our pre-registered (near significant, medium effect size) and post-hoc analyses (significant, medium effect size) provide some (though not full) support for our hypothesis that orientation to U.S. culture would be associated with higher levels of physical activity. Although the pre-registered model did not reach statistical significance ( $p < 0.07$ ), the effect sizes point to the potential clinical significance of the results (Sullivan & Feinn, 2012). The actor and partner effects found in both models equate to over an hour of physical activity per week for a one standard deviation change in U.S. orientation. We found that early adolescents with high U.S. orientation had lower MVPA than their peers (unexpected), but

their MVPA was higher when their mothers had high U.S. orientation (expected). By contrast, mid-adolescents who were high in U.S. orientation had higher MVPA than their peers (expected), particularly when their mothers had low U.S. orientation (unexpected).

There are several potential explanations for the findings about the contrast pattern of moderation by development stage, given that physical development and intensified interest in appearance (Gavin et al., 2014) co-occur with changing family expectations and parenting practices across adolescent development (Edwardson & Gorely, 2010). Younger adolescents' MVPA may benefit from higher autonomy granting or encouragement of physical activity by highly U.S. oriented mothers. Indeed, early adolescents more commonly perceived parents as influencing their physical activity, and we expect that the specific effect of parents will vary based on parents' own beliefs about physical activity, parenting practices, and cultural orientation. Meanwhile, mid-adolescents' own U.S. orientation may be more important for promoting their MVPA as U.S. fitness messages intersect with pubertal changes (e.g., an emphasis on thinness; building muscle) and since older youth are often granted more autonomy regardless of their mother's cultural orientation. Intriguingly, it seems that U.S. orientation is associated with higher MVPA when there is a contrast in the adolescent's and mother's U.S. orientation. Future research is needed to better understand developmental changes in the context of family dynamics where adolescents and their parents have differing remote culture orientations.

These results should be interpreted in the context of other literature on the influence of remote cultures on a range of health behaviors. A growing body of applied research has linked remote culture orientation to indicators of health and well-being, including risk for smoking among adolescents in Mexico (Lorenzo-Blanco et al., 2019) and psychological health among

emerging adults in South Africa (Ferguson & Adams, 2016). In Jamaica, one previous study examined the relation between remote acculturation and nutrition, another modifiable risk factor for obesity, finding that a stronger orientation towards the White U.S. American culture was associated with more unhealthy eating habits (Ferguson et al., 2018). This emerging body of literature on the health correlates of remote acculturation (see review by Eales et al., 2020), to which the current study contributes, suggests that whether remote culture orientation is a risk, protective, or neutral factor for health varies on the domain in question and the context. Our study further suggests that developmental stage may moderate the relation between remote culture orientation and health outcomes. As this field continues to grow, it will be important to attend to individual and contextual moderators.

Research into the specific aspects of remote cultures that convey risk and into moderators of these associations may identify individuals who are at greater risk for poor health outcomes and highlight protective factors to leverage in interventions. For example, Ferguson et al. (2018) found that higher U.S. orientation among Jamaican families was associated with unhealthier diets, and that this association was partially explained by greater exposure to U.S. cable TV food advertisements. Furthermore, media literacy buffered the association of remote acculturation with diet (Ferguson et al., 2020). Informed by these findings, Ferguson and colleagues (2019) developed the JUS Media? Programme to teach nutrition and media literacy. An RCT demonstrated that the program significantly improved nutrition knowledge, vegetable consumption (Ferguson et al., 2021) and advertising literacy among adolescents and mothers in Jamaica (Nelson, Powell, Ferguson, & Tian, 2020). Age may also emerge as an important moderator between cultural orientation and health outcomes. Though they should be interpreted cautiously, our findings point to the moderating effect of developmental stage on the association

between the parents' and adolescents' U.S. orientation and the adolescents' physical activity. Future work is needed to better understand whether and how the risk or protective effect of remote cultural orientation depends on developmental stage.

The study of remote acculturation could also provide an opportunity to advance acculturation research more generally. The number of studies examining the relation between physical activity and acculturation has grown in recent years, but the literature base thus far has primarily focused on proximal acculturation among adults following immigration or international study (Gerber et al., 2012; Yoh et al., 2008). Gerber et al. (2012) conducted a systematic review of 44 available studies examining acculturation and physical activity among immigrants (most commonly measured acculturation using a unidimensional framework or a proxy such as time since immigration) and results were mixed. Because these studies were focused on proximal acculturation, the effect of exposure to and identification with U.S. culture may be difficult to disentangle from the effect of any number of changes that co-occur following immigration (e.g., socioeconomic status changes, the loss and rebuilding of a social network, new work and domestic responsibilities, neighborhood characteristics). Remote acculturation, therefore, offers a unique, if imperfect, opportunity to investigate the degree to which U.S. orientation and, in particular, media messages about exercise, may be associated with physical activity levels.

This study has several notable strengths and limitations. First, the hypotheses and planned analyses were registered prior to data analysis. Second, remote acculturation was measured independently for each culture and using culturally tailored instruments, reflecting the best practices in this field of research. Items for assessing Jamaican and U.S. behavioral acculturation were chosen to reflect the primary means of cultural exposure (i.e., media enjoyment for the remote U.S. culture; broader domains for the proximal Jamaican culture). That noted, the

difference in items and the exclusive focus on media enjoyment for U.S. orientation limits direct comparisons. The limitations of this study include the reliance on self-report, including a self-reported measure of physical activity which shows only small to moderate correlations with objective measures of behavior (see meta-analysis by Lee et al., 2011); future studies using actigraphy data would strengthen the inferences that can be drawn. Additionally, while this study assessed remote acculturation using a composite of identity and behavior, future research could benefit from a multidomain assessment that includes values as well (Schwartz et al., 2010). Multidomain assessment could elucidate the unique and/or relative strengths of each domain's associations with MVPA. The test of developmental moderation is a strength, given that this is the first to examine the effect of developmental stage on the correlates of remote cultural orientation; however, future longitudinal research should measure change over time within individuals rather than across cohorts. Finally, it is possible that these results will not generalize to other contexts, calling for replication studies in other countries that are similarly exposed to U.S. cultural influences through globalization.

### **Conclusion**

The expansion of U.S. fitness culture shows associations with the development of health behaviors among adolescents in Jamaica, with differing effects based on their developmental stage and the alignment between their mother's U.S. orientation and their own. As youth develop in an increasingly globally connected world, efforts to reduce the risks and leverage the benefits of remote culture exposure may be important aspects of comprehensive health promotion interventions. Our results indicate that developmental stage and family context are important factors to consider when working to promote healthy lifestyles among youth exposed to remote cultural influences.

### References

- Birman, D., & Trickett, E. J. (2001). Cultural transitions in first-generation immigrants: acculturation of Soviet Jewish refugee adolescents and parents. *Journal of Cross-Cultural Psychology, 32*(4), 456–477. doi:10.1177/0022022101032004006
- Birman, D., & Zea, M. C. (1996). The development of a multidimensional acculturation scale for Latino adolescents. Unpublished manuscript, George Washington University, Washington, DC.
- Booth, M. (2000). Assessment of physical activity: an international perspective. *Research Quarterly for Exercise and Sport, 71*(sup2), 114-120. doi:10.1080/02701367.2000.11082794
- Byrne, B. M. (2010). *Structural equation modeling with AMOS: Basic concepts, applications, and programming* (2nd ed.). New York, NY: Routledge.
- Cook, W. L., & Kenny, D. A. (2005). The actor-partner interdependence model: A model of bidirectional effects in developmental studies. *International Journal of Behavioral Development, 29*(2), 101–109. doi:10.1080/01650250444000405
- Craig, C., L., Marshall, A. L., Sjöström, Bauman, A. E., Booth, M. L., & Ainsworth, B. E., Pratt, M., Ekelund, U., Yngve, A., Sallis, J. F., Oja, P. (2003). International Physical Activity Questionnaire: 12-country reliability and validity. *Medicine & Science in Sports & Exercise, 8*, 1381-1395. doi:10.1249/01.MSS.0000078924.61453.F
- de Heer, H. D., de la Haye, K., Skapinsky, K., Goergen, A. F., Wilkinson, A. V., & Koehly, L. M. (2017). Let's Move Together. *Health education & behavior: The official publication of the Society for Public Health Education, 44*(1), 141–152. doi:10.1177/1090198116644703
- de la Haye, K., Dirk de Heer, H., Wilkinson, A. V., & Koehly, L. M. (2014). Predictors of

parent-child relationships that support physical activity in Mexican-American families.

*Journal of Behavioral Medicine*, 37(2), 234–244. doi:10.1007/s10865-012-9471-8.

Dumith, S. C., Gigante, D. P., Domingues, M. R., & Kohl, H. W. (2011). Physical activity change during adolescence: A systematic review and a pooled analysis. *International Journal of Epidemiology*, 40(3), 685–698. doi:10.1093/ije/dyq272

Eales, L., Gillespie, S., Eckerstorfer, S., Eltag, E. M., Global Educators Group, & Ferguson, G. M. (2020). Remote Acculturation 101: A primer on research, implications, and illustrations from classrooms around the world. *Online Readings in Psychology and Culture*, 8(1). doi:10.9707/2307-0919.1168

Edwardson, C. L., & Gorely, T. (2010). Parental influences on different types and intensities of physical activity in youth: A systematic review. *Psychology of Sport and Exercise*, 11(6), 522–535. doi:10.1016/j.psychsport.2010.05.001

Eisenberg, M. E., Carlson-Mcguire, A., Gollust, S. E., & Neumark-Sztainer, D. (2015). A content analysis of weight stigmatization in popular television programming for adolescents. *International Journal of Eating Disorders*, 48(6), 759–766. doi:10.1002/eat.22348

Faro, A. L., McKee, L. G., Garcia, R. L., & Jones, D. J. (2018). The relationships between religiosity and youth internalizing symptoms in African American parent-adolescent dyads. *Cultural Diversity and Ethnic Minority Psychology*, 24(1), 139–149. doi:10.1037/cdp0000158

Ferguson, G. M. (2013). The big difference a small island can make: How Jamaican adolescents are advancing acculturation science. *Child Development Perspectives*, 7(4), 248–254. doi:10.1111/cdep.12051

- Ferguson, G. M., & Adams, B. G. (2016). Americanization in the Rainbow Nation: Remote acculturation and psychological well-being of South African emerging adults. *Emerging Adulthood, 4*(2), 104–118. doi:10.1177/2167696815599300
- Ferguson, G. M., Bornstein, M. H., & Pottinger, A. M. (2012). Tridimensional acculturation and adaptation among Jamaican adolescent-mother dyads in the United States. *Child Development, 83*(5), 1486–1493. doi:10.1111/j.1467-8624.2012.01787.x
- Ferguson, G. M., & Bornstein, M. H. (2015). Remote acculturation of early adolescents in Jamaica towards European American culture: A replication and extension. *International Journal of Intercultural Relations, 45*, 24-35. <https://doi.org/10.1016/j.ijintrel.2014.12.007>
- Ferguson, G. M., Fiese, B. H., Nelson, M. R., & Meeks Gardner, J. M. (2019). Transdisciplinary team science for global health: Case study of the JUS media? Programme. *American Psychologist, 74*(6), 725–739. doi:10.1037/amp0000383
- Ferguson, G. M., Muzaffar, H., Iturbide, M. I., Chu, H., & Meeks Gardner, J. (2018). Feel American, watch American, eat American? Remote acculturation, TV, and nutrition among adolescent–mother dyads in Jamaica. *Child Development, 89*(4), 1360–1377. doi:10.1111/cdev.12808
- Ferguson, G. M., Nelson, M. R., Fiese, B. H., Meeks Gardner, J. M., Koester, B., & JUS Media? Programme Study Team. (2020). U.S. media enjoyment without strong media literacy undermines adolescents’ and mothers’ reported efforts to reduce unhealthy eating in Jamaica. *Journal of Research on Adolescence*. doi:10.1111/jora.12571
- Ferguson, G. M., Meeks Gardner, J. M., Nelson, M. R., Giray, C., Sundaram, H., Fiese, B. H., Davis, B. K., Tran, S. P., Powell, R., & JUS Media? Programme Study Team (2021). Food-focused media literacy for remotely acculturating adolescents and mothers: A randomized



- controlled trial of the 'JUS Media? Programme'. *Journal of Adolescent Health*. Advance online publication. doi:10.1016/j.jadohealth.2021.06.006.
- Garcia, R. L., Kenny, D. A., & Ledermann, T. (2015). Moderation in the actor-partner interdependence model. *Personal Relationships*, 22(1), 8–29. doi:10.1111/per.12060
- Gavin, J., Keough, M., Abravanel, M., Moudrakovski, T., & Mcbrearty, M. (2014). Motivations for participation in physical activity across the lifespan. *International Journal of Wellbeing*, 4(1), 46–61. doi:10.5502/ijw.v4i1.3
- Gerber, M., Barker, D., & Pühse, U. (2012). Acculturation and physical activity among immigrants: A systematic review. *Journal of Public Health (Germany)*, 20(3), 313–341. doi:10.1007/s10389-011-0443-1
- Grant, M. A. & Lawrence, H. (2012). *Power & Glory: Jamaica in world athletics, from WWII to the Diamond League era*. Kingston Communications.
- Hollingshead, A. A. (1975). *Four-factor index of social status*. Unpublished manuscript, Yale University, New Haven, CT.
- Hu, L., & Bentler, P. M. (1999). Cutoff criteria for fit indexes in covariance structure analysis: Conventional criteria versus new alternatives. *Structural Equation Modeling*, 6(1), 1–55. doi:10.1080/10705519909540118
- IHRSA Global Report. (2020, January 7). *2019 fitness industry trends shed light on 2020 & beyond*. Retrieved from <https://www.ihrsa.org/improve-your-club/industry-news/>
- Jamaican Ministry of Health & Wellness. (2018). *Jamaica Health and Lifestyle Survey III (2016 – 2017)*. <https://www.moh.gov.jm/jamaica-health-and-lifestyle-survey-iii-2016-2017/>
- Kline, R. B. (2011). *Principles and practice of structural equation modeling* (3rd ed.). New York, NY: Guilford Press.

Klos, L. A., Greenleaf, C., Paly, N., Kessler, M. M., Shoemaker, C. G., & Suchla, E. A. (2015).

Losing weight on reality TV: A content analysis of the weight loss behaviors and practices portrayed on the biggest loser. *Journal of Health Communication, 20*(6), 639–646.

doi:10.1080/10810730.2014.965371

Labbrozzi, D., Robazza, C., Bertollo, M., Bucci, I., & Bortoli, L. (2013). Pubertal development, physical self-perception, and motivation toward physical activity in girls. *Journal of Adolescence, 36*(4), 759–765. doi:10.1016/j.adolescence.2013.06.002

doi:10.1016/j.adolescence.2013.06.002

Lee, P. H., Macfarlane, D. J., Lam, T. H., & Stewart, S. M. (2011). Validity of the international

physical activity questionnaire short form (IPAQ-SF): A systematic review. *International Journal of Behavioral Nutrition and Physical Activity, 8*(1), 1-11. doi:10.1186/1479-5868-

8-115

Lorenzo-Blanco, E. I., Arillo-Santillán, E., Unger, J. B., & Thrasher, J. (2019). Remote

acculturation and cigarette smoking susceptibility among youth in Mexico. *Journal of Cross-Cultural Psychology, 50*(1), 63–79. doi:10.1177/0022022118807578

Nelson, M. R., Powell, R., Ferguson, G. M., & Tian, K. T. (2020). Using subvertising to build families' persuasion knowledge in Jamaica. *Journal of Advertising, 49*(4), 477-494.

doi:10.1080/00913367.2020.1783725

O'Garra, K. G. N., Morgan, K. A. D., Hill, L. B. K., Reid, P., Simpson, D., Lee, H., & Edwards, C. L. (2019). Internalization of western ideals on appearance and self-esteem in Jamaican undergraduate students. *Culture, Medicine and Psychiatry, 44*(2), 249–262.

doi:10.1007/s11013-019-09652-7

doi:10.1007/s11013-019-09652-7

O'Reilly-Duff, H., Best, P., & Tully, M. A. (2018). Same old song and dance: An exploratory

study of portrayal of physical activity in television programmes aimed at young adolescents.

*BMC Research Notes*, 11(1), 1–6. doi:10.1186/s13104-018-3554-8

Putnick, D. L., & Bornstein, M. H. (2016). Measurement Invariance Conventions and Reporting:

The State of the Art and Future Directions for Psychological Research. *Developmental Review*, 41, 71–90. doi:10.1016/j.dr.2016.06.004

Robinson, T., Callister, M., & Jankoski, T. (2008). Portrayal of body weight on children's television sitcoms: A content analysis. *Body Image*, 5(2), 141–151.

doi:10.1016/j.bodyim.2007.11.004

Schwartz, S. J., Unger, J. B., Zamboanga, B. L., & Szapocznik, J. (2010). Rethinking the concept of acculturation: Implications for theory and research. *American Psychologist*, 65(4), 237–251. doi:10.1037/a0019330

Sullivan, G. M., & Feinn, R. (2012). Using effect size—or why the p value is not enough.

*Journal of Graduate Medical Education*, 4(3), 279–282. doi:10.4300/jgme-d-12-00156.1

Wilks, R., Younger, N., McFarlane, S., Francis, D., & Van Den Broeck, J. (2007). *Jamaican*

*Youth Risk and Resiliency Behaviour Survey 2006: Community-based survey on risk and resiliency behaviours of 15-19 year olds.*

World Health Organization. (2020, April 1). *Obesity and overweight*. Retrieved from

<https://www.who.int/news-room/fact-sheets/detail/obesity-and-overweight>

Yoh, T., Yang, H., & Gordon, B. (2008). Status of participation in physical activity among international students attending colleges and universities in the United States. *College*

*Student Journal*, 42(4), 1110–1117.

**Table 1**

*Descriptive Statistics of Weekly Hours of Physical Activity and Self-Reported Perceived Influences on Physical Activity among Early & Mid-Adolescent Boys and Girls and Their Mothers in Jamaica*

	Median Hours of Physical Activity Per Week	Percent Meeting JMOHW Guidelines	% Reporting each Perceived Influence on Physical Activity										
			Weather/Heat	Weight	Desire/Enjoyment	Health	Ads and Media	Time	Friends/To fit in	To look good	Parents	Other	
Mothers	2.5	47.6%	17.0	52.1	34.2	12.1	71.8	20.6	7.0	42.7	3.0	3.0	
Early Adolescent	Girls	2.0	25.0%	25.9	52.8	53.7	71.3	29.6	14.8	20.4	50.9	33.3	1.9
	Boys	4.7	45.2%	32.3	48.4	61.3	61.3	21.0	22.6	21.0	40.3	41.9	3.2
Mid-Adolescent	Girls	3.6	41.2%	26.5	48.0	56.9	65.7	17.6	23.5	15.7	56.9	21.6	2.0
	Boys	10.5	63.8%	29.3	39.7	67.2	65.5	22.4	22.4	25.9	51.7	20.7	1.7

*Note.* The Jamaican Ministry of Health and Wellness (JMOHW) recommends that youth from age 6 – 17 engage in one hour of moderate or vigorous physical activity at least five times per week and that adults engage in 30 minutes of activity five days per week.

**Table 2**

*Means, Standard Deviations, and Correlations Among Study Variables for Adolescents and Their Mothers in Jamaica*

	1.	2.	3.	4.	5.	6.	7.	8.	Early (0) or Mid (1) Adolescent	Girl (0) or Boy (1)	Adolescent Means (SD)
1. Jamaican Identity	<b>.16**</b>	.27**	-.49**	-.16	-.39**	-.08	.00	.02	.01	.01	3.69 (0.59)
2. Jamaican Behavior	.19**	<b>.22**</b>	-.21**	.17	-.04	-.09	-.03	.02	.14*	-.06	3.74 (0.64)
3. U.S. Identity	-.21**	-.11*	<b>.31**</b>	-.21	.75**	.01	.07	.01	-.08	.03	1.40 (0.68)
4. U.S. Behavior	-.06	.09	.21	<b>.26**</b>	.67**	.04	.02	-.01	.01	-.09	3.60 (1.04)
5. U.S. Orientation Composite	-.21**	-.06	0.74**	0.69**	<b>.92**</b>	-.02	.04	.00	-0.03	-0.03	0 (0.76)
6. Socioeconomic Status (SES)	-.05	-.03	-.10	-.06	-.06	<b>1.00</b>	.05	.03	-.04	.14**	10.11 (3.46)
7. Walking	.03	.04	.03	-.03	.04	-.06	<b>.21**</b>	.30**	.10	.12*	477.75 (732.86)
8. MVPA <sup>a</sup>	-.01	-.07	.14*	.09	.14*	-.01	.25**	<b>.26**</b>	.12*	.32**	1.62 (1.12)
Mothers Means (SD)	3.87 (0.35)	3.83 (0.52)	1.24 (0.54)	2.89 (0.99)	0 (0.77)	10.11 (3.46)	497.26 (711.97)	1.36 (1.25)			

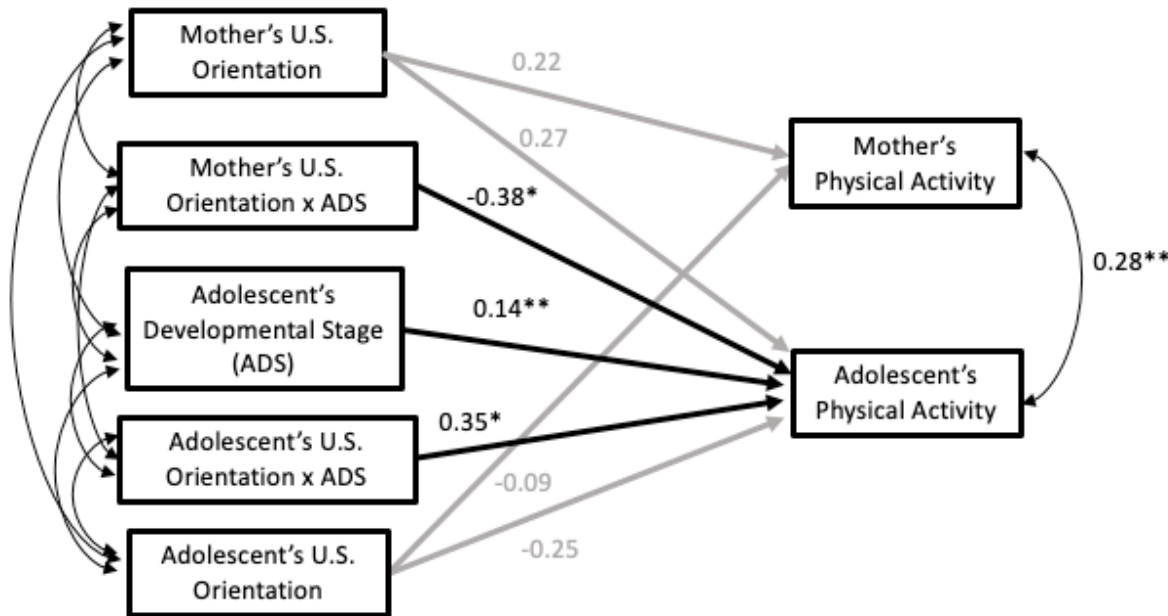
*Note.* The correlations among the mothers' variables are presented below the diagonal. The correlations among adolescents' variables, gender, and development stage are presented above the diagonal, whereas maternal correlations are below the diagonal. The correlations between mother and adolescent variables are presented in bold on the diagonal. Adolescents' mean scores are reported in the rightmost column, and their mother's mean scores are reported on the bottom row.

<sup>a</sup> Moderate and Vigorous Physical Activity (MVPA) hours per week was log-transformed.

\* p < 0.05, \*\* p < 0.01

**Figure 1**

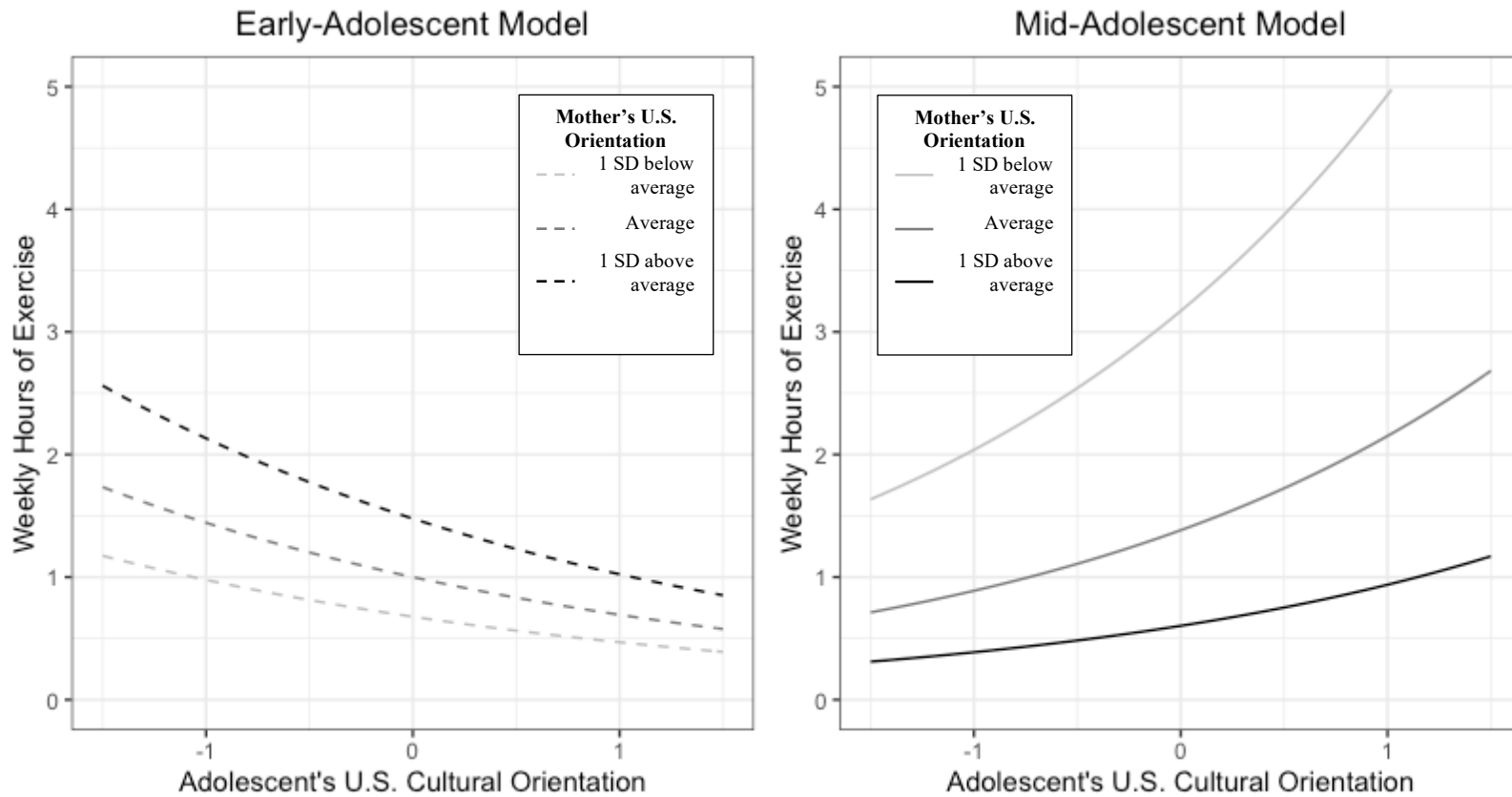
*Actor Partner Interdependence Moderation Model Predicting Moderate and Vigorous Physical Activity*



*Note.* This figure depicts the alternate, trimmed model of the actor and partner effects of U.S. cultural orientation on moderate and vigorous physical activity (MVPA) levels, as moderated by adolescent developmental stage (ADS; 0 = early adolescent; 1 = mid-adolescent). Standardized path estimates are presented for both significant (black) and non-significant (light gray) paths. \*  $p \leq 0.05$ , \*\*  $p < 0.01$ . A 0.35 – 0.38 standard deviation difference is equivalent to 64 – 70 minutes of MVPA per week.

**Figure 2**

*Model Predicted Weekly Hours of Moderate and Vigorous Physical Activity*



*Note.* The predicted values of adolescents' weekly hours of moderate and vigorous exercise are shown as a function of the adolescent's U.S. cultural orientation (actor: main effect), the mother's U.S. cultural orientation (partner: main effect), and the

adolescent's developmental stage (moderation of actor and partner effects). The partner effect of mothers' U.S. orientation on adolescents' physical activity is represented by plotting the predicted MVPA of adolescents whose mothers have high (1SD above average; dark gray), average (medium gray), and low (1SD below average; light gray) U.S. orientation for all levels of the adolescents' own U.S. orientation. For early adolescents (shown in dashed lines on left), higher U.S. orientation was associated with less weekly exercise. Additionally, holding early adolescents' own U.S. orientation constant, youth with more U.S.-oriented mothers had higher predicted exercise in this age group. For mid-adolescents (shown in solid lines on right), higher U.S. orientation was associated with higher weekly exercise. Additionally, holding mid-adolescents' own U.S. orientation constant, youth with less U.S.-oriented mothers had higher predicted exercise in this age group. The JMOHW recommends that youth from age 6 – 17 engage in one hour of physical activity at least five times per week and that adults engage in 30 minutes of activity five days per week.



