The Co-Development of Chores and Effortful Control among Mexican-Origin Youth and Prospective Work Outcomes

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Abstract

The present research examined: (a) the co-development of chores and effortful control, and (b) the prospective impact of effortful control development (i.e., initial levels and the trajectory of effortful control from late childhood through adolescence) on work outcomes in young adulthood. We used data from a longitudinal study of 674 Mexican-origin youth assessed at ages 10, 12, 14, 16, and 19. We found no evidence of co-developmental associations between chores and effortful control, but we found that higher initial levels of effortful control (age 10) predicted working-student status, less job stress, and better job fit, and steeper increases in effortful control from age 10 to 16 predicted higher job satisfaction and job autonomy in young adulthood (age 19).

Keywords: chores; effortful control; adolescence; development; employment; job stress; longitudinal; growth curve model; job satisfaction; work outcomes

1. Introduction

A few years ago, a bill was introduced to the Spanish parliament, proposing a new law that would require children to do household chores (Fotheringham, 2014). The underlying idea was that by doing chores, children and teens would learn to be responsible and regulate their behaviors, which would help them succeed in life and become more productive members of society. The law did not pass, but the lay belief that chores contribute to the development of self-regulation and responsibility is widespread across cultures. Similarly, there is widespread agreement that boosting one's self-regulation can impact future life success. But, is there any scientific evidence for these claims?

Self-regulation is the tendency to be organized, responsible, and self-controlled. It is well known that individual differences in self-regulation emerge early in life and predict important outcomes in adulthood, including work, relationships, delinquency, and health (e.g., Moffit et al., 2011; Roberts, Walton, & Bogg, 2005). Moreover, people differ not only in their *levels* of self-regulation at any given time, but also in their developmental trajectories (i.e., the way in which self-regulation changes over time, such as increases, decreases, or lack of change). Indeed, research has shown that self-regulation is malleable, can change across the lifespan, and that people differ in the ways and rates at which they change (e.g., Roberts, Walton, & Viechtbauer, 2006). The precursors for developmental change in self-regulation include both genetic and environmental factors (e.g., Deater-Deckard, 2014). Regarding environmental factors, a stressful family environment and school behavioral problems have been shown to hamper positive development (Atherton, Zheng, Bleidorn, & Robins, in press; Dumas et al., 2005), whereas self-regulation training programs, exercise training, and educational programs have been shown to promote the positive development of self-regulation (Blair & Diamond, 2008; Brier, 2015;

Diamond, 2012). Despite recent advances in understanding the etiology of self-regulation development, we are not aware of any research that has investigated the co-development of *chores* and self-regulation. This is a jarring oversight given the purported benefits of chores in developing self-regulation through childhood and adolescence (Rende, 2015). Also, the nature of chores (i.e., organized tasks that require goal pursuit in the face of competing motives) lends itself as a potentially excellent candidate for predicting self-regulation development. Thus, the first key goal of this paper was to test whether chores co-develop with self-regulation.

The second key goal of this paper was to test the extent to which changes in one's self-regulation from late childhood through adolescence (i.e., showing a positive developmental trajectory of change), would predict better work outcomes in young adulthood, above and beyond initial levels of self-regulation. Psychologists, economists, and sociologists generally agree that self-regulation levels measured *statically* early in life (e.g., during childhood or adolescence at one time point only) predict later career success (Aziz & Tronzo, 2011; Barrick & Mount, 1991; Barrick & Mount, 1993; Barrick, Mount, & Li, 2013; Damian, Su, Shanahan, Trautwein, & Roberts, 2015; Heckman, 2006; Hurtz & Donovan, 2000; Judge, Higgins, Thoresen, & Barrick, 1999; Nofle & Robins, 2007; Roberts, Caspi, & Moffitt, 2003; Salgado, 1997; Shanahan, Bauldry, Roberts, Macmillian, & Russo, 2014). However, despite the extensive previous research done on static *levels* of self-regulation and later outcomes, there is little research on the incremental role of self-regulation *trajectories* of change (over and above initial levels) in predicting later outcomes, with only two exceptions (Allemand, Job, & Mroczek, 2018; Converse, Beverage, Vaghef, & Moore, 2018).

Investigating the incremental validity of self-regulation change trajectories in predicting later outcomes (over and above initial levels) is important for both theoretical and practical

reasons. Theoretically, it is important to establish whether the associations between personality predictors and later outcomes are static or dynamic. Practically, it is important to know whether change trajectories in personality are predictive of life outcomes independent of initial levels. For example, if change and initial level showed independent effects, that would mean that a child who started off low in self-regulation, but improved through adolescence up to a medium level, could potentially show better future outcomes than a child who started off high in self-regulation, but then showed a declining trajectory down to a medium level. Disentangling static and dynamic processes would greatly inform personality intervention programs, which is a timely issue, because policymakers have already called for early childhood intervention programs intended to increase self-regulation (Bleidorn et al., in press; Cavadel, Kauff, Anderson, McConnell, & Derr, 2017; Heckman, 2012; Murray, Rosanbalm, & Christopoulos, 2016).

Self-regulation is a broad construct, but in childhood it is generally conceptualized as “effortful control,” the tendency to regulate one’s impulses and behaviors, to focus and shift attention easily, and to motivate the self toward a goal when there are competing desires (Rothbart & Bates, 2006). Thus, throughout this paper, we focus on effortful control.

The present research examined: (a) the co-development of chores and effortful control, and (b) the prospective impact of effortful control development (i.e., initial levels and the trajectory of effortful control from late childhood through adolescence) on later work outcomes. To achieve these goals, we used data from a longitudinal study of 674 Mexican-origin youth assessed at ages 10, 12, 14, 16, and 19.

1.1. Development of Effortful Control and the Potential Role of Chores

How does effortful control (and related self-regulatory traits) develop from childhood through adolescence? One way to understand development is to evaluate mean-level changes,

that is, changes in the average trait level of a population. Previous research suggests that, on average, children's effortful control tends to increase in early childhood, from age 2 to 6 (Carlson, 2005; Eisenberg, Spinrad, & Eggum, 2010; Kochanska & Knaack, 2003; Kochanska, Murray, & Harlan, 2000; Li-Grining, 2007) and during the transition into adolescence from age 6 to 12 (King, Lengua & Monahan, 2013; Murphy, Eisenberg, Fabes, Shepard, & Guthrie, 1999). Historically, the patterns of mean-level change in self-regulatory traits across adolescence (i.e., age 13 to 18) have been somewhat mixed. Although it was initially thought that self-regulatory traits would continue to increase from late childhood to young adulthood (Branje, van Lieshout, & Gerris, 2007; Donnellan, Conger, & Burzette, 2007; Roberts et al., 2006), more recent research has found either *no changes* in mean-level effortful control during adolescence from age 12 to 16 (Klimstra, Hale, Raaijmakers, Branje, & Meeus, 2009), or even *decreases* over time from late childhood to late adolescence, ages 10 to 17 (Borghuis et al., 2017; De Fruyt et al., 2006; Laceulle, Nederhof, Karremar, Ormel, & Van Aken, 2012; Leon-Carrion, Garcia-Orza, Perez-Santamaria, 2004; Soto, John, Gosling, & Potter, 2011; Van den Akker, Dekovic, Asscher, & Prinzie, 2014). In line with the latter findings, previous work with the dataset used in the present study also found *decreases* in effortful control from age 10 to 16 (Atherton et al., in press). Considering these recent findings, the current consensus among many researchers is that a "self-regulatory dip" may occur from late childhood to late adolescence (De Fruyt et al., 2006; Klimstra et al., 2009; Soto et al., 2011; Soto & Tackett, 2015; Tackman, Srivastava, Pfeifer, & Dapretto, 2017; Van den Akker et al., 2014). From late adolescence to young adulthood and beyond, people are expected to resume the well-established, mean-level increases in self-regulatory traits that are consistent with the *maturation principle* (Bleidorn, Kandler, Riemann, Angleitner, & Spinath, 2009; Blonigen, Carlson, Hicks, Krueger, & Iacono, 2008; Damian,

Spengler, Sutu, & Roberts, 2018; Helson & Moane, 1987; Murphy et al., 1999; Roberts, Caspi, & Moffitt, 2001; Roberts, Walton, & Viechtbauer, 2006; Robins, Fraley, Roberts, & Trzesniewski, 2001; Van den Akker et al., 2014). The temporary “self-regulatory dip” during adolescence is presumably due to the profound biological, psychological, and social changes that occur during this period (Soto & Tackett, 2015).

Despite the somewhat mixed findings regarding mean-level change patterns in self-regulatory traits across adolescence, which may be partly attributed to differences in how different components of self-regulation change over time (Atherton, Lawson, & Robins, under review), one consistent finding across the literature is the extensive within-person variability in change patterns, whereby some people increase, others decrease, and others remain stable in their self-regulatory trait levels across the same developmental period. Thus, even if mean-levels showed decreases in effortful control over a certain developmental period, it is possible to test for correlates of positive change at the individual level.

Indeed, an individual difference approach is necessary because mean-level changes or “normative trajectories” cannot explain *why* some children successfully develop the capacity to self-regulate, whereas others continually give in to their impulses and fail to persevere toward their goals. Which factors contribute to these individual differences? One possibility is that youths need resources and practice to develop their self-regulatory abilities (Denissen, van Aken, Penke, & Wood, 2013), and opportunities for practice can be influenced by the youths’ social environment and the demands placed on them. Some of the largest demands placed on developing youth are in the school environment. In fact, the school environment is akin, in many ways, to self-regulation interventions, given that children are required to enact self-regulatory skills to comply with social and structural rules within the classroom, complete homework in a

timely manner, etc. Previous research has shown that effortful control co-develops with school-related experiences such as homework and school behavioral problems (Atherton et al., in press; Goellner et al., 2017; Ludtke, Roberts, Trautwein, & Nagy, 2011; Tackman, et al., 2017), but no research has investigated the co-development of effortful control with outside-of-school demands, such as household chores. The lack of relevant research is surprising given the widespread belief among parents (and even government officials, as in the Spanish parliament bill) that chores foster responsibility and other self-regulatory traits in their children. So how might the demands of chores contribute to the development of effortful control across childhood and adolescence?

The TESSERA framework (Wrzus & Roberts, 2017) posits that long-term personality development results from repeated short-term situational processes (TESSERA sequences) coupled with associative and reflective processes. Short-term TESSERA sequences consist of Triggering situations, Expectancies, States/State Expressions, and Reactions. Triggering situations are any events or daily situations that are external to the person and place an environmental pressure to respond. Parents assigning household chores is a potential triggering situation, because the assignment usually comes with a set of expectations for appropriate behavior. Expectancies represent the known set of appropriate or useful behaviors associated with a triggering situation (either self- or other-imposed) that serve to achieve a goal. Household chores come with such expectancies because there are specific performance standards associated with each chore that can be clearly explained by parents or observed by the child. States and State Expressions are momentary thoughts, feelings, and behaviors that occur in the specific situation, after expectancies have been triggered. For example, when it comes to chores, children might engage in deep thought on best ways achieve the task goals or they might not; regarding

feelings, they might feel enthusiastic about doing a good job or they might feel bored; regarding behaviors, they might persist and aim for good performance or they might give up. Reactions follow state expressions, and they can come either from oneself (reinforcement through emotions) or others (reinforcement and punishment, e.g., verbal feedback, facial behavior such as smiling or frowning, or monetary incentives) in response to states. For example, after completing their chores, youth may feel pride/shame in their performance (i.e., for matching/mismatching their state/expressions or behaviors with the task expectancies) or may be praised/admonished by their parents. With this, the short-term TESSERA sequence ends. A crucial element in transforming such short-term processes into long-term personality development is repetition. Regarding chores, repetition of the short-term TESSERA sequences is likely, because parents are likely to assign chores more than once (e.g., on a weekly basis), which may be one reason as to why chores may have important influences on self-regulation development. Repeatedly experiencing TESSERA sequences can lead to long-term personality change through associative or reflective processes. Associative processes imply that over the course of many repetitions, triggers become associated with behaviors while the self-concept is also activated, and thus, over time, changes in implicit self-concept may occur, thus leading to personality change. Reflective processes presumably change and maintain personality by consciously thinking about one's past experiences, behavior, thoughts, and feelings. Thus, regarding chores, it is possible that after experiencing the TESSERA sequence multiple times (e.g., a scenario where task persistence and good performance at undesirable chore activities led to pride or praise), children may start integrating "persistence in the face of competing tasks" into their self-concept, which may eventually lead to lasting changes in personality traits such as effortful control, where regulating impulses and behaviors are key components. Notably, the

above sequence of processes does not happen in a vacuum. Instead, person-environment transactions (Buss, 1987) play a key role, because people select and create different environments in correspondence with their personality, which means that it is due to personality traits in the first place that personality (in)congruent triggering situations and states can occur. For example, children who are higher in effortful control to begin with might be given or ask for more chores from their parents, which would then set in motion the processes described above and result in increasing engagement with chores across time, as well as increasing levels of effortful control. Thus, it is possible that the co-development of chores and effortful control is bidirectional. In this paper, we tested the co-development of chores and effortful control from age 10 to 16.

1.2. Effortful Control in Adolescence and Later Work Outcomes

The second key goal of this paper was to test to what extent trajectories of change in effortful control (from late childhood through adolescence), would predict work outcomes in young adulthood, above and beyond initial levels of effortful control. We are not aware of any research linking *effortful control* in childhood/adolescence with later work outcomes, but we review below research on related self-regulatory traits.

As mentioned earlier, most previous research has used *statically* measured self-regulatory traits (i.e., trait levels measured at one time point) as prospective predictors of work outcomes. Thus, multiple *longitudinal* studies have found that adolescents who were higher on self-regulatory traits tended to have more successful job outcomes later in life. For example, constraint (i.e., the tendency to endorse social norms, act in a cautious and restrained manner, and avoid thrills) measured in late adolescence prospectively predicts higher occupational attainment, higher job satisfaction, higher work commitment, better job fit (i.e., how well an

employee is suited for their position), more material benefits, and more financial independence in early adulthood (Le, Donnellan, & Conger, 2014; Roberts et al., 2003). Higher levels of self-regulatory traits, such as constraint and mature personality measured in adolescence, have also been found to predict higher occupational prestige in young adulthood (Damian et al., 2015; Roberts et al., 2003).

But, why would higher levels of self-regulatory traits measured in adolescence predict better work outcomes in young adulthood? Several different processes have been put forward to explain this relation. For example, the link between self-regulatory traits and later work outcomes may reflect “recruitment effects,” whereby people are selected into jobs/education based on their self-regulation levels. In fact, most employers prefer people who are more organized, responsible, punctual, and industrious (Cook, Vance, & Spector, 2000; Sackett & Walmsley, 2014). Even early levels of self-regulatory traits in childhood and adolescence are likely essential because recruitment effects start emerging early in development. For example, children’s personality traits begin to influence their relationships with teachers, which snowball into later educational attainment and work outcomes (Birch & Ladd, 1998). Self-regulatory traits may also impact job fit and job satisfaction, and lower job stress, because people who are more conscientious take a more active role in shaping their work environment to better fit their personalities (Bell & Staw, 1989; LePine, Hollenbeck, Ilgen, & Hedlund, 1997; Roberts et al., 2006; Wrzesniewski & Dutton, 2001). In turn, increased fit with work environments predicts better performance and lower job stress (Harms, Roberts, & Winter, 2006). Another mechanism through which self-regulatory traits may predict work outcomes, is “attrition” or “deselection pressures,” whereby people leave (or are released from) jobs that require self-regulation (e.g., those that require high levels of autonomy, attention to detail, punctuality etc.) (Cairns & Cairns,

1994; Caspi, Wright, Moffitt, & Silva, 1998; Kokko, Bergman, & Pulkkinen, 2003; Pulkkinen & Kokko, 2000). Finally, self-regulatory traits may predict work outcomes, and especially job performance, because they consistently predict stronger goal setting and self-efficacy (Erez & Judge, 2001; Judge & Ilies, 2002).

A notable disconnect in the literature is that theory puts forward *dynamic processes* governed by person-environment transactions, whereas empirical research has focused so far largely on *static links* between self-regulation measured at one point and work outcomes measured at a later point. But what about self-regulation changes across time and *their* impact on outcomes? We know that people's self-regulation levels are malleable and change across time, and many intervention programs aimed at children and teens hope to boost self-regulation to improve future work outcomes. However, apart from only *two* studies (Allemand et al., 2018; Converse et al., 2018), there is no empirical research investigating the role of self-regulation change trajectories in predicting later work outcomes over and above initial levels of self-regulation. Of these two studies, the first investigated the role of self-control development from age 16 to 29 on work outcomes at age 29, and work outcomes included job satisfaction and income (Converse et al., 2018). The second study investigated the role of self-control development from age 12 to 16 on work outcomes at age 35, and the work outcomes included occupational self-efficacy beliefs, achievement motivation, and willingness to further training and development (Allemand et al., 2018). Both studies found evidence for an incremental role of self-control change (over and above initial levels) in predicting work outcomes, such that increases in self-control predicted better work outcomes. However, these previous studies also had some drawbacks. Specifically, both studies used self-reports only to assess self-control, and they called for future studies to use a multi-method approach, where self-regulatory traits are

assessed using both self- and informant-reports to boost their validity. Moreover, intelligence was also self-reported in one of the studies (Allemand et al., 2018), parental socio-economic status was missing from the other study (Converse et al., 2018), and the types of work outcomes assessed across the two studies were limited to job satisfaction and work engagement. Finally, the age range covered only included adolescence, but not late childhood, which is an important omission because self-regulation intervention programs supported by policymakers focus on *childhood* intervention (Cavadel et al., 2017; Heckman, 2012; Murray et al., 2016). We addressed these gaps and extended the findings in the present study.

1.3.Present Study

We used data from a 10-year longitudinal study of Mexican-origin youth (N=674) who were assessed at ages 10, 12, 14, 16, and 19, with retention rates of 86-92%. The goals of the study were twofold. First, we tested whether household chores and effortful control co-developed from age 10 to 16. Second, we tested whether initial levels of effortful control (age 10), as well as increasing trajectories from age 10 to 16, predicted better work outcomes in young adulthood (age 19).

Regarding the co-development of chores and effortful control, we hypothesized that higher initial levels of chores would be associated with higher initial levels of effortful control, higher initial levels of chores would be associated with steeper increases in effortful control, higher initial levels of effortful control would be associated with steeper increases in chores, and steeper *increases* in chores would be associated with steeper *increases* in effortful control from age 10 to 16. Moreover, because girls tend to do more chores than boys (Duckett, Raffaelli, & Richards, 1989) and tend to show higher effortful control levels (Atherton et al., in press; Else-Quest, Hyde, Goldsmith, & Van Hulle, 2006), we tested whether gender moderated the co-

development of chores and effortful control. Additionally, given our unique sample of Mexican-origin youth, we were able to test another potential moderator of individual differences in co-development: nativity status (i.e., born in the U.S. vs. born in Mexico). We did not have specific predictions regarding these moderation analyses, and thus, they are exploratory. It is possible that cultural norms associated with nativity status may impact the associations between chores and effortful control, because youth born in Mexico (who may be less acculturated) experience both higher expectancies from their parents to perform chores, as well as more satisfaction from performing chores if they see it as a duty to their family. These differences may result in developmental processes that are more intense for those where social norms are pushing them more towards those behaviors and thus, the co-development pathways between chores and effortful control may be stronger for youth born in Mexico.

Regarding the prospective impact of effortful control development on work outcomes and based on previous work on related self-regulation constructs, we hypothesized that higher initial levels and steeper increases in effortful control would be associated with more positive work outcomes (i.e., employment, job satisfaction, job fit, job autonomy, satisfaction with job performance, and lower job stress and work-relationship conflict). We also tested whether the link between effortful control development and work outcomes varied by gender and nativity status. Although we did not have clear predictions regarding moderation, we thought exploratory analyses could inform future research, as one could argue that early boosts in effortful control might benefit people's work outcomes differently based on their demographic characteristics (e.g., if women are expected to exhibit higher levels of effortful control in the work place, then perhaps a boost would be more beneficial for them; or conversely, because men tend to start lower in effortful control as children, perhaps a boost would be more beneficial for them).

This study makes several novel contributions. First, this is the first study to test the co-development of chores and effortful control. Second, this is one of only three studies (the others being Allemand et al., 2018; Converse et al., 2018) to test the prospective association between self-regulatory *change* (above and beyond initial levels) and work outcomes; in this context, this is the first study to use self-regulation change trajectories assessed from late childhood through adolescence, and it is the first study to focus on effortful control, which is a particularly relevant trait in this age group. Third, unlike the previous two studies on the topic (Allemand et al., 2018; Converse et al., 2018), which only used self-reports, we used both self- and parent-reports of effortful control to reduce the influence of method variance. Fourth, we statistically controlled for family socio-economic status (SES) and child intelligence (measured at age 10) in all analyses; including these covariates was essential because previous research has shown that parental SES and intelligence impact work outcomes, and self-regulatory trait development (e.g., Damian et al, 2015; Shanahan et al., 2014). Fifth, we measured a wide variety of work outcomes in young adulthood (age 19), including employment status, job satisfaction, job stress, job fit, job autonomy, satisfaction with job performance, and work-relationship conflict (of these outcomes, only job satisfaction was assessed previously in relation to self-control change). Having multiple outcomes available in the same data set is important for comparing the magnitude and robustness of the associations across different types of job outcomes. Sixth, this is the first study to test moderating effects of gender and nativity status, which have been previously theorized to be associated with effortful control (Else-Quest et al., 2006; Garcia-Coll & Marks, 2011). Seventh, this is the first study to use a low socio-economic status (SES), ethnic minority sample, where people tend to join the workforce early. Specifically, we used a sample of Mexican-origin youth, which is essential for several reasons: (a) diversity in psychological samples is essential for

ecological validity; (b) Mexican-origin youth are an understudied but rapidly growing ethnic minority group (U. S. Census Bureau, 2010); and (c) as the labor force becomes increasingly Hispanic/Latino, there is a dire need to better understand the developmental precursors in occupational outcomes in this population.

2. Method

All the data analysis scripts and codebooks necessary to reproduce these results are available on the Open Science Framework (OSF) at the following address: <https://osf.io/rkjb8/>. Furthermore, all the output files are available at the same address.^{1, 2}

2.1. Participants and Procedures

Data for the study came from the California Families Project, a longitudinal study of Mexican-origin youth and their parents ($N = 674$ families) designed to examine risk and protective factors for drug use and other behavioral problems.³ Children were drawn at random from rosters of students from the Sacramento and Woodland, CA, school districts. The focal child had to be in the 5th grade, of Mexican origin, and living with his or her biological mother, to be eligible to participate in the study. 72.6% of the eligible families agreed to participate in the study, which was granted approval by the [blinded] Institutional Review Board (Protocol # 217484-21). The children (50% female) were interviewed, by trained staff members, in their homes in Spanish or English, depending on their preference.

The present study uses data from when the children were 10.8, 12.8, 14.7, 16.8, and 19.8 years old (on average). We selected the four waves of data collected at ages 10 through 16, because that is when both chores and effortful control were assessed. We selected the latest wave of data currently available, age 19, to assess work outcomes and use prior effortful control development to prospectively predict outcomes. Covariates (i.e., family SES, child intelligence)

were measured at age 10. Family-level retention rates (relative to the original sample of 674) were 86% at age 12, 91% at age 14, 90% at age 16, and 92% at age 19. To investigate the potential impact of attrition, we compared individuals who did and did not participate in the age 19 assessment on study variables assessed at age 10. No significant differences were found in effortful control ($t(670) = -1.50, p = .13$) or nativity status ($t(664) = -.42, p = .68$). However, individuals who dropped out of the study at age 19 were more likely to do more chores ($t(669) = -2.79, p = .01$), be male ($t(672) = -2.21, p = .03$), have lower family SES ($t(664) = -2.23, p = .03$), and have lower fluid and verbal IQ at age 10 ($t(659) = -2.27, p = .02$ and $t(660) = -2.99, p = .003$, respectively). Below we provide details about all measures used in the current study.

2.2. Measures

2.2.1. Chores.⁴ At ages 10, 12, 14, and 16, children self-reported on chores they did at home. They provided binary (yes/no) answers to the question, “*Do you do the following chores at home?*”, which was followed by a list of 14 chores: Doing your own laundry; Doing the family’s laundry; Cleaning the house, such as vacuuming, dusting, etc.; Planning or preparing dinner for the family; Taking out the garbage; Doing dishes; Doing yard work like mowing the lawn, raking leaves, etc.; Taking care of brother or sister; Fixing things around the house; Cleaning your room; Setting the table; Shopping for food; Taking care of pets; Doing other chores around the house. These fourteen dichotomous items were summed to form one overall index of the number of chores at each age. For descriptive statistics of the chores index, see Table 1. We used the sum scores at each age as an observed variable (not a latent variable) in all subsequent analyses.

2.2.2. Effortful control. Children and their mothers completed the Effortful Control scale (16 items) from the short form of the *Early Adolescent Temperament Questionnaire*—

Revised when the child was 10, 12, 14, and 16 years old (*EATQ-R*; Ellis & Rothbart, 2001). The *EATQ-R* assesses various aspects of self-control including the capacity to anticipate and suppress inappropriate responses; the capacity to focus attention and shift attention when desired; and the capacity to perform an action when there is a strong tendency to avoid it. This scale includes items such as, “*When someone tells [you/your child] to stop doing something, it is easy for [you/your child] to stop.*” and “*[You/your child] pay close attention when someone tells [you/your child] how to do something.*” Ratings were made on a 4-point scale ranging from 1 (*not at all true of you/your child*) to 4 (*very true of you/your child*). For descriptive statistics, see Table 1. We computed a latent factor of ‘effortful control’ using four indicators, which were computed by creating parcels of randomly selected items and then averaging across child and mother reports of those items. Child- and mother-reports of effortful control correlated between .40 and .45 across ages. The loadings of the indicators on the latent variables ranged from .71 to .80 across waves.

2.2.3. Work Outcomes Age 19. When participants were 19, 58.8% of the sample reported that they had either part- or full-time employment, whereas 39.2% of the sample reported having a student status only (of the student sample, 96% reported being in college and 4% in high-school), 24% of the sample reported being both a student and employed, and 11.3% of the sample reported being neither a student nor employed. Furthermore, the participants who reported being employed in the last 12 months (regardless of whether they have current employment or not ($N=467$)), also reported on five other work outcomes, including job satisfaction, satisfaction with job performance, job stress, job fit, and job autonomy. There were 396 participants who indicated that they were currently employed at the time the interview was conducted. Additionally, participants who reported being employed (or a student) *and* in a

romantic relationship ($N=277$), reported on their work-relationship conflict. Below, we describe these variables in more detail, and Table 2 includes descriptive statistics and reliabilities for all work outcomes.

2.2.3.1. Job satisfaction. At the age 19 assessment, participants reported the degree to which they were enthusiastic about and satisfied with their work using five items that were assessed in Judge, Bono, & Locke (2000). Items included statements such as, “*Overall, you are fairly satisfied with your job*” and “*Each day of work seems like it will never end* (reverse-coded)”. Ratings were made on a 5-point scale ranging from 1 (strongly disagree) to 5 (strongly agree). We created a latent factor of job satisfaction that was comprised of three indicators, which were computed by creating parcels of randomly selected items. The loadings of the indicators were .73, .75, and .87 on the latent variable.

2.2.3.2. Satisfaction with job performance. At the age 19 assessment, participants reported the extent to which they were satisfied with their own job performance using one item created by researchers with the *California Families Project*. The item asks, “Overall, you are satisfied with how well you are performing your job”. Ratings were made on a 5-point scale ranging from 1 (strongly disagree) to 5 (strongly agree). We used this single item as an *observed* (not latent) variable outcome in the structural equation models.

2.2.3.3. Job experiences (stress, fit, autonomy). At the age 19 assessment, participants completed a 16-item scale that assesses three aspects of job experiences: job stress, job fit, and job autonomy. The items used in the present study were drawn from a scale administered in the *Family Transitions Project*, and later confirmed via factor analyses to provide coherent job experience domains (see Le et al., 2014). The job stress subscale (6 items) assesses the extent to which the participant experiences stress, tension, and lack of control in their work, and includes

items such as “*There is a lot of stress and tension in this job*” and “*I am frequently held responsible for tasks over which I have no control*”. The job fit subscale (5 items) assesses the degree to which the participant’s work matches what they like to do, as well as the amount of variety or repetition on the job. The job fit subscale includes items such as, “*My job matches what I like to do*” and “*I do the same things over and over in my work*”. The job autonomy subscale (5 items) assesses the extent to which the participant has a lot of freedom and self-determination in their work, and includes items such as, “*On my job, I have very little freedom to decide how I work*” and “*In this work, I am mostly my own boss*”. Ratings were made on a 5-point scale ranging from 1 (strongly disagree) to 5 (strongly agree). For each of the job experience domains, we created latent variables comprised of three indicators on each factor, which were computed by creating parcels of randomly selected items. The loadings of the indicators were .81, .83, and .84 for job stress, .38, .63, and .77 for job fit, and .35, .60, and .84 for job autonomy.

2.2.3.4. Work-relationship conflict. At the age 19 assessment, participants completed a four-item scale that assessed the extent to which their work (and their partner’s work) interfered with their romantic relationship, as well as the extent to which their romantic relationship interfered with their own (and their partner’s) work. The items used in the present study were adapted from questions administered in the *Family Transitions Project* and used in previous published work with the data (see Matthews, Conger, & Wickrama, 1996). The items were worded as, “*How often do the demands of your [your partner’s] job or schoolwork interfere with your romantic relationship?*” and “*How often do the demands of your romantic relationship interfere with your [your partner’s] job or schoolwork?*” Ratings were made on a 4-point scale ranging from 1 (never) to 4 (often). We created a latent variable of work-relationship conflict

that included each item as an indicator on the factor. The loadings of the indicators were .71, .74, .80, and .82 on the latent variable.

2.2.4. Covariates

2.2.4.1. *Nativity status.* Participants were categorized as 1st generation if their birth country was Mexico (29%); as 2nd generation if their birth country was the U.S., and only one of their parents was reported as being born in the U.S. (62%); and as 3rd generation if their birth country and both parents were born in the U.S. (9%). Because of the low percentage of 3rd generation youth, we created a dichotomous nativity status variable comparing 1st generation (born in Mexico) to 2nd+ generation (born in U.S.) youth in all analyses.

2.2.4.2. *Family socioeconomic status.* At the age 10 assessment, mothers reported their own and their child's biological fathers' total years of education. A parent education variable was created by averaging the mother's and father's education level (for single-parent families, we used the mother's education level). The resulting variable ranged from 0 to 19 years ($M=9.3$, $SD=3.3$). 63% of mothers and 65% of fathers had less than a high school education.

Total annual household income was reported by the mothers at the age 10 assessment using a 20-point ordinal response scale, with response options increasing in \$5,000 increments (1="Less than \$5,000", 2="\$5,000-\$10,000", ..., up to 20="95,000 or more"). We recoded this response scale into dollar values by taking the midpoint dollar range for each response option (1="\$2,500", 2="\$7,500", ..., up to 20= "\$100,000") ($Mdn = \$32,500$ at age 10). We divided total household income by household size at each assessment to compute per capita income. Family SES was computed as a standardized composite of parent education level and per capita income ($r = .34$).

2.2.4.3. IQ. At age 10, the child took the Woodcock-Johnson III Test (Woodcock, Mather, & McGrew, 2001), which is a widely-used cognitive abilities measure used to assess both Gc (crystallized intelligence) and Gf (fluid intelligence). This test measured Gc (or verbal IQ) using the Synonyms, Antonyms, Verbal Analogies, and Picture Vocabulary subtests. It measured Gf (or fluid IQ) using the Visual Matching subtest (and time to complete Visual Matching). For the present sample, the average verbal IQ score was 90.85 ($SD=13.22$) and the average fluid IQ score was 94.81 ($SD=14.36$) at age 10. To control for IQ in our analyses, we used a standardized composite of verbal and fluid intelligence ($r = .27$).

2.3. Statistical Analyses

All analyses were conducted using *Mplus* Version 7 (Muthén & Muthén, 1998-2011). We used a robust maximum likelihood estimator (MLR) to account for non-normal distributions of observed variables and full information maximum likelihood procedure (FIML) to account for missing data (Allison, 2003; Schafer & Graham, 2002). We used item parcels as indicators on the latent variables because they typically produce more stable solutions, are less likely to share specific sources of variance, and reduce the likelihood of spurious correlations (Little, Cunningham, Shahar & Widaman, 2002; Little, Rhemtulla, Gibson, & Schoemann, 2013). For all analyses, we assessed adequate model fit via chi-square and degrees of freedom, CFI values (for which adequate fit is indicated by values greater than .95), and the root-mean-square error of approximation (RMSEA) (for which adequate fit is indicated by values less than or equal to .06) (Hu & Bentler, 1998; Hu & Bentler, 1999).

2.3.1. Measurement Invariance. Before testing the structural pathways between effortful control and chores, we conducted longitudinal measurement invariance tests of effortful control. Longitudinal measurement invariance is evaluated across all the time-points

simultaneously, with the goal of trying to establish strong invariance whenever possible (Widaman, Ferrer, & Conger, 2010). We conducted model comparisons and assessed adequate model fit via change in chi-square and degrees of freedom, as well as change in comparative fit index (ΔCFI) less than or equal to .01, and change in McDonald's non-centrality index (ΔNCI) less than or equal to .02 (Meade, Johnson, & Braddy, 2008; Cheung & Rensvold, 2002) because they are more accurate and less biased fit indices for large sample sizes. To evaluate measurement invariance over time, we compared three measurement models: (1) freely estimating the factor loadings for the latent factors at each age of assessment (i.e., configural invariance); (2) constraining the respective factor loadings to be equal at each age of assessment (i.e., weak invariance); and (3) constraining the factor loadings and intercepts to be equal at each age of assessment (i.e., strong invariance). If the more constrained models do not fit worse than the lesser constrained models, then we can conclude that the structure of effortful control is the same over time. When the strong invariance model fit significantly worse than the weak invariance model, we compared a "partial" strong invariance model with the weak invariance model (Widaman et al., 2010). Effortful control had partially strong invariance over time ($RMSEA=.02$, $CFI=.99$, $TLI=.99$). Table 3S in the Supplemental Material shows the measurement model comparisons.

2.3.2. Modeling the Co-Development of Effortful Control and Chores. To examine whether effortful control and chores co-develop from age 10 to 16, we conducted univariate and bivariate latent growth curve models. We first conducted *univariate* latent growth curve (LGC) models to examine the individual trajectories of chores and effortful control (for a review, see Duncan, Duncan, & Strycker, 2006).⁵ To find the best-fitting growth trajectories, for both chores and effortful control, we conducted a series of model comparisons and evaluated changes in

model fit indices. Specifically, we compared three models: (1) no growth model, where the slope is fixed to be zero over time; (2) linear growth model, where the slope linearly increases by one unit over time, with the first time point centered at ‘0’, the second time point fixed at ‘2’,..., and the last time point is fixed at ‘6’; and (3) a latent basis model, where the first and last time points of the slope are fixed (at ‘0’ and ‘6’, respectively) and the middle time points are freely estimated to the data. In all models, path coefficients from the intercept to the repeated assessments are fixed to 1, and the intercept and slope are allowed to covary. Tables 4S and 5S (see supplemental materials) show the results of the model comparison tests for the univariate trajectories of chores and effortful control. A linear change trajectory was retained for chores, with individuals (on average) *increasing* in chores over time. Additionally, as reported in previous published work (Atherton et al., in press), a linear change trajectory was retained for effortful control, with individuals (on average) *decreasing* in effortful control over time.

After retaining the best-fitting univariate latent growth curves, we conducted bivariate LGC models to investigate the co-developmental associations between chores and effortful control (see Fig. 1). Bivariate latent growth curve models specify correlations between the levels of chores and effortful control at age 10 (i.e., concurrent associations), correlations between the slopes of chores and effortful control (i.e., correlations between trajectories), and the level of chores at age 10 and the slope of effortful control; and vice versa (i.e., prediction of each trajectory). We controlled for family SES and child IQ, assessed at age 10, in our bivariate LGC models.

2.3.3. Prospective Effects of Effortful Control Development on Work Outcomes.

To understand the influence of effortful control development on work outcomes in young adulthood, we specified a structural equation model that includes the univariate trajectory of

effortful control as a predictor of each of our work outcomes of interest (see Fig. 2). Specifically, we regressed each work outcome on the level of effortful control (at age 10) and the slope of effortful control (from age 10 to 16), which allows us to understand the extent to which participants' effortful control at age 10 influences work outcomes at age 19, as well as the extent to which participants' *changes* in effortful control from age 10 to 16 influence work outcomes at age 19. For dichotomous work outcomes (e.g., employment status), we specified the outcome as 'categorical' in Mplus to run a logistic regression. In all analyses, we controlled for family SES and child IQ, assessed at age 10.

2.3.4. Moderating Effects of Gender and Nativity Status

Last, we conducted multiple-group models to understand whether the co-developmental associations between chores and effortful control, and the prospective influence of the effortful trajectory on work outcomes, are the same across gender and nativity statuses. For the bivariate LGC models between chores and effortful control, we compared a model where the correlations between the levels, the slopes, and the levels and slopes were freely estimated across groups to a model where these correlations were constrained to be equal across groups. If constraining the correlations across groups do not fit significantly worse, then we can conclude that the co-developmental associations between chores and effortful control are the same for: (1) boys vs. girls, and (2) youth born in the U.S. versus born in Mexico.

For the structural equation models that examine the prospective effects of the effortful control trajectory on work outcomes, we compared a model where the regression paths of the level and slope of effortful control on the work outcome were freely estimated across groups to a model where these regression paths were constrained to be equal across groups. If constraining the regression paths across groups do not fit significantly worse, then we can conclude the

influence of effortful control at age 10, and changes in effortful control from age 10 to 16, on work outcomes are the same for: (1) boys vs. girls, and (2) youth born in the U.S. versus born in Mexico.

2.3.5. Monte Carlo Power Simulation Studies

Notably, the present sample of 674 participants had 80% power (at $\alpha = .05$) to detect effects as small as a correlation of .10. To further establish the precision with which we estimated the effects presented in this paper, we conducted Monte Carlo power simulation studies of the univariate, bivariate, conditional, and multiple group latent growth curve models of effortful control, chores, and work outcomes in *Mplus* Version 7 (Muthén & Muthén, 1998-2011). These simulation studies were conducted post-hoc with 500 replications each. We specified the simulation studies to be based on the present sample sizes (accounting for missing data over time) for each analysis, as well as providing starting values based on the results from each analysis in the present study. Results from these simulations allowed us to determine the percentage of times the given effect sizes occurred within (or outside) the 95% confidence intervals across all 500 replications.

3. Results

3.1. Inter-correlations

Table 3 includes correlations between all variables in the study. Several patterns of associations stood out. First, correlations between effortful control and chores ranged between -.14 and .12, with only two correlations being statistically significant (and one of those significant correlations being negative). These findings, albeit not too promising, justified testing the co-development of effortful control and chores.

A second pattern of correlations that stood out were those between effortful control levels at each age and later work outcomes ($|r| = .12$ to $.30$). Specifically, we found that higher levels of effortful control in childhood and adolescence were prospectively associated with a higher likelihood of being a student, higher job satisfaction, higher satisfaction with job performance, higher job fit, and lower job stress. These associations were in line with previous research, and justified testing our second model, where we looked at prospective effects of effortful control development on the outcomes.

Third, we found that family SES correlated positively with effortful control ($r = .08$ to $.25$), as did child IQ ($r = .19$ to $.29$). Furthermore, SES and IQ correlated positively with student status and work outcomes ($r = .13$ to $.31$). Overall, this indicated that we needed to statistically control for family SES and child IQ across the next models, which is in line with previous research.

Fourth, we found gender differences in effortful control, with girls showing higher levels ($r = .13$ to $.16$, a well-replicated finding; Else-Quest et al., 2006). We largely found no statistically significant gender differences in chores (except for at age 14), but nativity status seemed to make a difference in chores, with children/teens who were born in the U.S. (as opposed to born in Mexico) doing more chores at age 10 and 12. These findings, suggested that testing moderation effects by gender and nativity status in our models was warranted.

3.2. The Co-Development of Effortful Control and Chores

As seen in Table 4, the correlations between (a) the intercepts (i.e., initial levels at age 10) of effortful control and chores, (b) the slopes of effortful control and chores, (c) the level of chores and slope of effortful control, and vice versa were not statistically significant. Thus,

despite our predictions, chores and effortful control did not appear to co-develop from age 10 to 16.

We also tested whether the co-development of effortful control and chores differed for boys vs. girls or for youths born in the U.S. versus born in Mexico. For the multiple-group bivariate LGC models, constraining the correlations between levels, between slopes, and between levels and slopes to be equal across gender fit significantly worse than the unconstrained model, which allowed these correlations to differ for boys and girls ($\Delta\chi^2/\Delta df = 12.46/4, p = .01$; CFI = .82 and RMSEA = .10 for unconstrained model), suggesting that gender moderated the co-development of chores and effortful control. Specifically, we found that, although all effect sizes (except for one) were still non-significant in both the girls and boys models, the effects for boys and girls were in opposite directions, except for the influence of the level of EC on the slope of chores (which was in the same direction for boys and girls). Effects that were in the opposite direction for boys and girls showed that, for example, boys had a negative correlation between chores and effortful control at age 10, whereas girls had a positive correlation. Within each of the gender groups, the only significant association was between the level of effortful control at age 10 and the slope of chores from age 10 to 16 for girls ($r = -.20, p = .04, 95\%CI [-.39, -.01]$). Notably, these effects should be interpreted with great caution given the exploratory nature of the moderation analyses and the lack of reliable and statistically significant effects within groups. For nativity status, the constrained model did not fit significantly worse than the unconstrained model ($\Delta\chi^2/\Delta df = 4.23/4, p = .38$; CFI = .88 and RMSEA = .08 for constrained model), suggesting that the co-development of effortful control and chores did not differ for youth born in the U.S. vs. Mexico.

3.3. Prospective Effects of Effortful Control Development on Work Outcomes

Table 5 includes results from structural equation models across work outcomes. Model fit for each of the models can be found in Table 7S in the Supplemental Materials. Regarding prospective effects of initial levels of effortful control (age 10) on outcomes, we found that higher effortful control at age 10 was associated with a higher likelihood of being a student, a higher likelihood of being both employed and a student at the same time, less job stress, and better job fit 9 years later ($\beta = -.15$ to $.25$; for p -values and 95% CIs see Table 5). Additionally, regardless of initial levels of effortful control, children who increased in effortful control from age 10 to 16, had higher job satisfaction ($\beta = .25, p < .001$) and higher job autonomy ($\beta = .18, p = .04$). All other prospective associations of effortful control change and outcomes were not statistically significant.

We also tested whether the prospective effect of effortful control initial level (at age 10) and change (from age 10 to 16) on work outcomes differed by gender or nativity status. We found no evidence for moderation (see Table 8S of our supplemental materials for detailed results).

3.4. Statistical Power Based on Monte Carlo Simulation Studies

By conducting Monte Carlo simulation studies in Mplus, we were able to estimate the proportion of replications for which the population parameter values (specified based on the effect sizes found in the present study) are contained within the 95% confidence interval. Generally, these proportions indicate how adequate the population parameter and standard error estimates are from each model. Across all models (i.e., univariate, bivariate, conditional, and multiple group latent growth curve models), we found that at least 92% (if not more) of the simulated replications for each model contained the population parameter value(s) of interest

within the 95% confidence interval(s), suggesting that the effects we presented in this study, using our particular sample size and missing data pattern, were estimated with high precision.⁶

4. Discussion

Using a longitudinal sample of Mexican-origin youth, we tested two key questions: (a) to what extent do chores and effortful control co-develop from childhood (age 10) through adolescence (age 16) and (b) to what extent does effortful control development from age 10 to 16 predict work outcomes in young adulthood (age 19). We also performed exploratory analyses on the moderating roles of gender and nativity status.

We found no evidence of co-developmental associations between chores and effortful control, with four out of four of our hypotheses receiving no empirical support. These null effects were surprising given the strong lay conceptions and theoretical basis for our predictions. However, there are several possible substantive explanations for why chores might not in fact co-develop with effortful control in the population. First, it is possible that chores do not contribute to the development of effortful control, and that there are meaningful developmental differences between out-of-school tasks (like chores) and school-related tasks (given that the latter have been found to co-develop with self-regulatory traits; Goellner et al., 2017). Why would chores be different? Perhaps school takes precedence as both parents and children realize that school is more important for their future, or that the school environment is a stronger force in shaping effortful control than the chore environment. Second, it is possible that the theory of personality development that we used to make our predictions (e.g., TESSERA; Wrzus & Roberts, 2017) is wrong; however, given previous evidence in support of this theory and related personality development processes, we think this is unlikely. Third, it is possible that chores are a developmentally normative task (i.e., all kids, more or less, do them after a certain age), and

thus, they may not shape effortful control unless performed at a non-normative, much younger age (i.e., maybe chores do shape effortful control, but only for those who start doing them much earlier than others, long before age 10 when we started our assessments).

Regarding the prospective link between effortful control development and work outcomes, we found that (a) initial levels of effortful control (age 10) were associated with a higher likelihood of being both employed and a student at the same time, less job stress, and better job fit 9 years later, and (b) regardless of initial levels of effortful control, children who increased in effortful control from age 10 to 16, had higher job satisfaction and job autonomy. These findings were in line with previous research and with our predictions. However, it is important to note that only 4 out of the 9 effects we tested were statistically significant when looking at the role of initial levels of effortful control on later outcomes, and only 2 out of the 9 effects we tested were statistically significant when looking at the role of effortful control slope on later outcomes. Thus, the effects of childhood levels and change in effortful control appear to be modest when it comes to later work outcomes. The relatively small effects and lack of robustness across work outcomes is consistent, however, with previous findings by Le and colleagues (2014), who found that constraint (a trait related to effortful control) measured in adolescence had some positive associations with work outcomes later on, but the effects were not consistent across outcomes. One possible explanation for these small effects is that, because self-regulatory traits continue to change extensively across the lifespan, long after childhood and adolescence (Roberts et al., 2006; Damian et al., 2018), their earlier (vs. later) levels and change trajectories might be less relevant for work outcomes. In other words, people's self-regulation levels and change trajectories between ages 10-16 might be less relevant to their work outcomes at 35, when compared to their self-regulation levels and trajectories between ages 20 and 26. The

latter may potentially “wash out” earlier effects of levels and change trajectories in self-regulation, due to their proximity to measured outcomes. Thus, although our findings suggest that levels of effortful control, as well as changes in effortful control from age 10 to 16, are somewhat important for later work outcomes, and thus early interventions might be warranted, we cannot exclude the possibility that later interventions might be more effective, long-lasting, and show more robust effects across different types of work outcomes.

Regarding the exploratory moderation analyses, we found no evidence that the co-development of chores and effortful control, and the effect of effortful control development on work outcomes, differed by gender or nativity status, with one exception. We found that the co-development of chores and effortful control significantly differed for boys and girls. Specifically, although the co-developmental pathways remained non-significant for both genders, the direction of the effects were in opposite directions. Boys showed a non-significant negative correlation between chores and effortful control (i.e., more chores, lower effortful control), whereas girls showed a non-significant positive correlation (i.e., more chores, higher effortful control). It is of course too early to draw any conclusions, especially because these analyses were exploratory and the effects between chores and effortful control were non-significant for both genders; however, these findings raise an interesting possibility of the ways in which the co-development of chores and effortful control may look different based on gender norms, roles, and expectations.

4.1. Limitations

This work had several limitations. First, our measure of chores was perhaps not sensitive enough. At each time point, we assessed how many different types of chores the youths were involved in, but we did not assess the level of engagement or effort they spent on those chores. It

is possible that it is not the number of different chores that youth do that influences effortful control, but rather, the amount of effort, timeliness, and completeness in which youth do chores, or whether the chores were self-imposed or assigned. Second, it is possible that we need a larger sample size to detect associations between chores and effortful control, which may be very small in the population. However, a previous study using the same data found statistically significant effects of the co-development of school behavioral problems and effortful control (Atherton et al., in press), which suggests that the sample is large enough to detect key co-developmental processes, but perhaps the effects of chores are much smaller than those of school behavioral problems. Third, it is possible that the spacing and timing of the data collection waves was not ideal for capturing the co-development of chores and effortful control. Given that children were likely exposed to chores prior to age 10, perhaps the bulk of the co-development already happened long before we started the assessment. Fourth, we measured work outcomes at a very early age (19), which might be too early to assess accurate estimates of our participants' work lives. Fifth, given our participant sample, the present findings may not be generalizable beyond Mexican-origin youth and young adults (though, this remains an empirical question); and similarly, the results cannot be generalized beyond the specific measurement scales used.

4.2. Conclusion

The present work contributes to the broader literature in personality development by providing the first test of the co-developmental associations between chores and effortful control. Moreover, the present study also contributes to the industrial/organizational literature by showing that early levels of effortful control, as well as changes that occur from childhood through adolescence show modest prospective associations with some work outcomes in young adulthood. On a practical level, the present findings suggest that perhaps early interventions

meant to increase effortful control could be useful for people's future career prospects, and that such increases in effortful control can be useful regardless of children's initial levels of effortful control, although we should approach this conclusion with caution, given the small effects observed and relatively low number of statistically significant findings per number of tests conducted. Finally, although clearly not definitive, the lack of evidence for the co-development between chores and effortful control, suggests that perhaps parents (and governments) overestimate the beneficial effects of chores on children's personality development. It is probably for the better that the Spanish bill did not pass.

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Footnotes

¹The data are part of a larger ongoing longitudinal study with multiple owners, not all of whom are authors on this paper. Thus, the data cannot be shared publicly at the moment, but are available to researchers upon request.

²This study was not pre-registered.

³Seven papers from the California Families Project have examined effortful control (Atherton, Conger, Ferrer, & Robins, 2016; Atherton, Lawson, Ferrer, & Robins, in press; Atherton, Tackett, Ferrer, & Robins, 2017; Atherton, Zheng, Bleidorn, & Robins, in press; Clark, Donnellan, Conger, & Robins, 2015; Robins, Donnellan, Widaman, & Conger, 2010; Taylor, Widaman, & Robins, in press). None have examined any of the antecedent factors used in the present study. Furthermore, no papers have looked at work outcomes measured in young adulthood in this sample or at how effortful control predicts these outcomes. Atherton, Zheng, Bleidorn, & Robins (in press) and Atherton, Lawson, Ferrer, & Robins (in press) report the trajectory of effortful control from age 10 to 16, but only as a means for examining co-development with school behavioral problems and ADHD, ODD, and CD symptoms (respectively). We note in text that this trajectory has been reported in previous published work. For a full list of California Families Project publications, see: <https://osf.io/rn34p/>.

⁴In addition to the 14 chore items, the participants also responded to one ‘paid work’ item, which we coded as “1” if participants reported having earned money from any of the following tasks during the past year: babysitting; work for parents/grandparents/other family members (other than chores; e.g., in family business); job at restaurant, pool, supermarket, etc. (not for relatives); work at, or make/sell things for church or school; mow lawns, rake leaves, sweep sidewalks, etc. (not chores for family); and/or paper route. For the sake of (a) testing the

robustness of the results presented in the paper and (b) including all relevant items available in the data, we formed a 15-item “chores” index that included the “paid work” item and re-ran the descriptive statistics on the “chores” index, the correlations, and the co-development of effortful control and chores analyses). All results conducted using the 15-item “chores” index (including the “paid work” item) can be found in Tables 1S (analogous to Table 1), 2S (analogous to Table 3), and 6S (analogous to Table 4), respectively, of the Supplemental Materials. Notably, all results reported in the paper (using the 14-item chore index), remained similar in magnitude and the same in terms of statistical significance, when we include the “paid work” item as part of the 15-item “chores” composite.

⁵Because we created latent variables for effortful control, we conducted *second-order* univariate latent growth curve models, rather than observed univariate latent growth curve models (as we did for chores).

⁶We were unable to conduct Monte Carlo simulation studies for the multiple group analyses by nativity of the influence of effortful control on satisfaction with job performance, job autonomy, and work-relationship conflict. As noted in Table 8S, the multiple group models allowing these influences to vary across nativity statuses did not converge, and therefore, we did not have effect sizes to use as estimates in the Monte Carlo simulations.

Table 1

Descriptive Statistics of Effortful Control and Chores

	Age 10		Age 12		Age 14		Age 16	
	<i>M (SD)</i>	α	<i>M (SD)</i>	α	<i>M (SD)</i>	α	<i>M (SD)</i>	α
Effortful control (16 items)	2.96 (.34)	.79	2.99 (.34)	.82	2.94 (.35)	.81	2.94 (.33)	.82
Chores (14 items)	8.12 (2.63)	--	8.38 (2.41)	--	8.17 (2.52)	--	8.41 (2.44)	--

Note. Values are the descriptive statistics of the observed variables (not the latent variables).

Table 2

Descriptive Statistics of Work Outcomes (age 19)

	<i>M (SD)</i>	<i>α</i>
Job satisfaction (5 items)	3.55 (.71)	.82
Satisfaction with job performance (1 item)	4.08 (.67)	--
Job stress (6 items)	2.30 (.78)	.85
Job fit (5 items)	2.95 (.65)	.61
Job autonomy (5 items)	3.35 (.64)	.56
Work-relationship conflict (4 items)	1.70 (.70)	.84

Table 3
Correlations Among Demographic Variables, Effortful Control, Chores, and Job Outcomes

	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.	13.	14.	15.	16.	17.	18.	19.	20.
1. Gender	--																			
2. Nativity Status	.13	--																		
3. Family SES	.03	.34	--																	
4. Child IQ	.08	.07	.22	--																
5. Effortful Control (age 10)	.15	.11	.25	.29	--															
6. Effortful Control (age 12)	.13	-.04	.11	.25	.66	--														
7. Effortful Control (age 14)	.13	-.01	.08	.19	.58	.73	--													
8. Effortful Control (age 16)	.16	-.02	.10	.22	.52	.66	.73	--												
9. Chores (age 10)	.09	.19	.07	-.04	.03	.04	.01	.08	--											
10. Chores (age 12)	-.00	.14	.06	.12	.05	.10	.06	.06	.49	--										
11. Chores (age 14)	.10	.08	.05	-.04	.07	.05	.12	.06	.40	.50	--									
12. Chores (age 16)	.07	-.03	-.15	-.16	-.14	-.09	-.07	-.08	.35	.48	.58	--								
13. Employment Status (age 19)	-.08	-.08	-.03	.04	.08	-.06	.05	.01	.04	.07	-.02	.00	--							
14. Student Status (age 19)	.18	.07	.31	.27	.27	.30	.20	.26	.06	.05	.02	-.04	-.25	--						
15. Employed & Student (age 19)	.18	-.04	.19	.23	.26	.27	.20	.24	.05	.08	-.02	-.06	.89	.97	--					
16. Job Satisfaction (age 19)	-.01	-.08	-.05	.05	.03	.06	.09	.18	-.01	.05	-.07	.04	.19	-.01	.09	--				
17. Satisfaction w/ Job Perf. (age 19)	.08	.08	.06	.13	.06	.04	.15	.12	.05	-.04	-.01	-.06	.12	.06	.06	.37	--			
18. Job Stress (age 19)	.09	.13	.02	-.08	-.08	-.13	-.17	-.17	.08	-.12	.04	.09	-.08	-.07	-.07	-.65	-.20	--		
19. Job Fit (age 19)	-.03	-.06	-.10	-.10	.06	.12	.06	.14	.02	.01	-.01	.00	-.02	-.05	-.08	.96	.01	-.54	--	
20. Job Autonomy (age 19)	-.06	-.13	-.06	-.10	-.00	-.02	.01	.10	.03	.04	-.05	.04	.14	-.08	-.04	.76	.36	-.39	.79	--
21. Work-Relationship Conflict (age 19)	.06	.03	.13	.19	.19	.05	.07	.10	.02	-.11	.00	-.07	.01	.30	.22	-.11	-.10	.23	-.06	-.06

Table 4

Bivariate Latent Growth Curve Model between Effortful Control and Chores from Age 10 to 16

	<i>r</i>	p-value	95% CI
Levels of Chores and Effortful Control at age 10	.09	.16	[-.04, .22]
Slopes of Chores and Effortful Control from age 10 to 16	-.08	.50	[-.30, .15]
Level of Chores at age 10 and Slope of Effortful Control from age 10 to 16	.10	.24	[-.07, .27]
Level of Effortful Control at age 10 and Slope of Chores from age 10 to 16	-.07	.38	[-.23, .09]

Note. *r* = correlation coefficient. Results are while controlling for family socioeconomic status and child IQ, assessed at age 10. Chores is comprised of 14 dichotomous items.

Table 5

The Influence of the Effortful Control Trajectory on Job Outcomes at Age 19

	Effortful Control Level → Job Outcome			Effortful Control Slope → Job Outcome		
	β	p-value	95% CI	β	p-value	95% CI
Employment Status	.04	.60	--	.01	.87	--
Student Status	.25*	.00	--	.10	.16	--
Employed AND Student	.25*	.00	--	.09	.26	--
Job Satisfaction	.12	.06	[-.01, .25]	.25*	.00	[.10, .41]
Satisfaction with Job Performance	.06	.33	[-.06, .17]	.12	.11	[-.03, .27]
Job Stress	-.15*	.02	[-.28, -.05]	-.15	.07	[-.31, .01]
Job Fit	.18*	.01	[.05, .33]	.12	.19	[-.06, .29]
Job Autonomy	.07	.33	[-.07, .20]	.18*	.04	[.01, .35]
Work-Relationship Conflict	.05	.50	[-.10, .20]	-.11	.30	[-.31, .10]

Note. Results are while controlling for family socioeconomic status and child IQ, assessed at age 10.

Figure 1. *Bivariate latent growth curve model between chores and effortful control*

Figure 2. *Effortful control trajectory predicting job outcomes at age 19*

Supplementary Materials

Table 1S

Descriptive Statistics of Effortful Control and Chores (including additional “paid work” item)

	Age 10		Age 12		Age 14		Age 16	
	<i>M (SD)</i>	α	<i>M (SD)</i>	α	<i>M (SD)</i>	α	<i>M (SD)</i>	α
Effortful control (16 items)	2.96 (.34)	.79	2.99 (.34)	.82	2.94 (.35)	.81	2.94 (.33)	.82
Chores (15 items)	7.98 (3.23)	--	8.60 (2.51)	--	8.49 (2.60)	--	8.60 (2.47)	--

Note. Values are the descriptive statistics of the observed variables (not the latent variables).

Table 2S. *Correlations Among Demographic Variables, Effortful Control, Chores (including “paid work” item), and Job Outcomes*

	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.	13.	14.	15.	16.	17.	18.	19.	20.	21.
					EFFORTFUL CONTROL ETIOLOGY AND CONSEQUENCES																
1. Gender	--																				
2. Nativity Status	.13	--																			
3. Family SES	.03	.34	--																		
4. Child IQ	.08	.07	.22	--																	
5. Effortful Control (age 10)	.15	.11	.25	.29	--																
6. Effortful Control (age 12)	.13	-.04	.11	.25	.66	--															
7. Effortful Control (age 14)	.13	-.01	.08	.19	.58	.73	--														
8. Effortful Control (age 16)	.16	-.02	.10	.22	.52	.66	.73	--													
9. Chores (age 10)	.06	.13	.07	-.01	.02	.10	.03	.10	--												
10. Chores (age 12)	-.02	.13	.07	.09	.04	.08	.06	.07	.37	--											
11. Chores (age 14)	.06	.07	.02	-.06	.04	.01	.08	.01	.30	.46	--										
12. Chores (age 16)	.05	-.04	-.12	-.14	-.12	-.06	-.06	.01	.23	.45	.57	--									
13. Employment Status (age 19)	-.08	-.08	-.03	.04	.08	-.06	.05	.01	.05	.09	-.00	.01	--								
14. Student Status (age 19)	.18	.07	.31	.27	.27	.30	.20	.26	.07	.04	-.01	-.03	-.25	--							
15. Employed & Student (age 19)	.18	-.04	.19	.23	.26	.27	.20	.24	.08	.07	-.02	-.05	.89	.97	--						
16. Job Satisfaction (age 19)	-.01	-.08	-.05	.05	.03	.06	.09	.18	.03	.03	-.06	.04	.19	-.01	.09	--					
17. Satisfaction w/ Job Perf. (age 19)	.08	.08	.06	.13	.06	.04	.15	.12	.04	-.03	-.03	-.04	.12	.06	.06	.37	--				
18. Job Stress (age 19)	.09	.13	.02	-.08	-.08	-.13	-.17	-.17	.03	-.07	.01	.10	-.08	-.07	-.07	-.65	-.20	--			
19. Job Fit (age 19)	-.03	-.06	-.10	-.10	.06	.12	.06	.14	.05	.01	.01	-.03	-.02	-.05	-.08	.96	.01	-.54	--		
20. Job Autonomy (age 19)	-.06	-.13	-.06	-.10	-.00	-.02	.01	.10	-.01	.11	-.03	.02	.14	-.08	-.04	.76	.36	-.39	.79	--	
21. Work-Relationship Conflict (age 19)	.06	.03	.13	.19	.19	.05	.07	.10	.05	-.08	-.03	-.07	.01	.30	.22	-.11	-.10	.23	-.06	-.06	

Table 3S

Model Comparisons of Longitudinal Measurement Invariance for Effortful Control

	Δ CFI	Δ NCI	$\Delta \chi^2 / \Delta$ DF	Sig.
Effortful Control				
Configural - Weak	.00	.00	14.11 / 9	.12
Weak - Strong	.03	.11	168.68 / 9	.00
Weak - Partial Strong	.00	.02	26.12 / 3	.00

Note. Δ CFI = comparative fit index; Δ NCI = change in McDonald's non-centrality index; $\Delta \chi^2$ = change in chi-square; Δ DF = change in degrees of freedom; Sig. = significance level of chi-square test.

Table 4S

Model Comparisons for Univariate Latent Growth Curve Models for Chores

	No Growth	Linear	Latent Basis
Slope Loadings			
$\beta(0)$	0	0	0
$\beta(2)$	0	2	1.31*
$\beta(4)$	0	4	2.96*
$\beta(6)$	0	6	6
Means (Variances)			
Level	8.29* (2.97*)	8.17* (3.62*)	8.19* (3.35*)
Slope	-- (--)	.04 (.10*)	.04* (.11*)
Covariances			
Level, Slope	--	-.23*	-.19
Goodness-of-Fit			
Chi-square (χ^2)	48.67	8.61	8.31
Degrees of freedom	8	5	3
RMSEA [90% CI]	.09 [.06, .11]	.03 [.00, .07]	.05 [.01, .09]
CFI	.93	.99	.99
Fit changes, $\Delta\chi^2/\Delta df$	--	40.06 / 3	.3 / 2

Note. Values are unstandardized coefficients. DF=degrees of freedom. RMSEA=Root-mean-square-error of approximation. CI=90% confidence interval. CFI=Comparative fit index.

Table 5S

Model Comparisons for Second-Order, Univariate Latent Growth Curve Models of Effortful Control

	No Growth	Linear	Latent Basis
Slope Loadings			
$\beta(0)$	0	0	0
$\beta(2)$	0	2	2.36
$\beta(4)$	0	4	4.84
$\beta(6)$	0	6	6
Means (Variances)			
Level	.00 (.12*)	.00 (.13*)	.00 (.13*)
Slope	-- (--)	-.01* (.002*)	-.01* (.00)
Covariances			
Level, Slope	--	-.01*	-.01
Goodness-of-Fit			
Chi-square (χ^2)	185.689	151.683	151.394
Degrees of freedom	94	91	89
RMSEA [90% CI]	.04 [.03, .05]	.03 [.02, .04]	.03 [.02, .04]
CFI	.982	.988	.988
Fit changes, $\Delta\chi^2/\Delta df$	--	34.01 / 3	.29 / 2

Note. Values are unstandardized coefficients. DF=degrees of freedom. RMSEA=Root-mean-square-error of approximation. CI=90% confidence interval. CFI=Comparative fit index.

Table 6S

Bivariate Latent Growth Curve Model between Effortful Control and Chores from Age 10 to 16

	<i>r</i>	p-value	95% CI
Levels of Chores and Effortful Control at age 10	.08	.23	[-.05, .22]
Slopes of Chores and Effortful Control from age 10 to 16	-.12	.29	[-.35, .10]

Level of Chores at age 10 and Slope of Effortful Control from age 10 to 16	.16	.08	[-.02, .35]
Level of Effortful Control at age 10 and Slope of Chores from age 10 to 16	-.08	.32	[-.24, .08]

Note. r = correlation coefficient. Results are while controlling for family socioeconomic status and child IQ, assessed at age 10. Chores is comprised of the 14 dichotomous items plus one item that asks about paid work.

Table 7S

Sample Sizes and Fit Indices Information for Analyses between Effortful Control and Job Outcomes

	N	χ^2 / df	RMSEA	CFI
Employment Status	655	233.21 / 133	.034	.967
Student Status	655	231.58 / 133	.034	.968
Employed AND Student	655	229.22 / 133	.033	.969
Job Satisfaction	450	264.14 / 169	.029	.984
Satisfaction with Job Performance	450	217.31 / 133	.031	.984
Job Stress	445	264.85 / 169	.029	.984
Job Fit	450	224.68 / 169	.022	.990
Job Autonomy	450	233.84 / 169	.024	.988
Work-Relationship Conflict	264	322.56 / 189	.033	.977

Table 8S

Multiple Group Models of the Influence of the Effortful Control Trajectory on Job Outcomes at Age 19 By Gender and Nativity Status

	By Gender		
	$\Delta\chi^2$	Δdf	p-value
Employment Status	3.71	2	.16
Student Status	1.61	2	.45
Employment & Student Status	.65	2	.72
Job Satisfaction	1.87	2	.39
Satisfaction with Job Performance	.33	2	.85
Job Stress	2.95	2	.23
Job Fit	.70	2	.70
Job Autonomy	2.43	2	.30
Work-Relationship Conflict	5.74	2	.06
	By Nativity Status		
	$\Delta\chi^2$	Δdf	p-value
Employment Status	1.18	2	.55
Student Status	.62	2	.73
Employment & Student Status	1.80	2	.41
Job Satisfaction	.74	2	.69
Satisfaction with Job Performance	*no convergence		
Job Stress	2.19	2	.34
Job Fit	1.72	2	.42
Job Autonomy	*no convergence		
Work-Relationship Conflict	*no convergence		

Note. Significant p-values for the chi-square difference tests indicate that the constrained model fit significantly worse than the freely estimated model across groups. Non-significant p-values indicate that the constrained model *did not* fit significantly worse (i.e., no differences across groups).