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Reassessing the relationship between general intelligence and self-control in childhood

Ryan C. Meldrum [a,*], Melissa A. Petkovsek [b], Brian B. Boutwell [c], Jacob T.N. Young [d]

[a] Department of Criminal Justice, Steven J. Green School of International and Public Affairs, Florida International University, 11200 SW 8th St., PCA-364B, Miami, FL 33199, United States
[b] Department of Criminal Justice, University of Central Missouri, P.O. Box 800, Warrensburg, MO 64093, United States
[c] Criminology & Criminal Justice, School of Social Work, Department of Epidemiology (Secondary Appointment), College for Public Health & Social Justice, Saint Louis University, 3550 Lindell Boulevard, St. Louis, MO 63103, United States
[d] School of Criminology and Criminal Justice, Arizona State University, 411 North Central Avenue, Phoenix, AZ 85004, United States

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ABSTRACT

Intelligence has consistently been recognized as a robust correlate of health, life success, and behavior. Evidence also suggests that intelligence may contribute to another key correlate of behavior: self-control. The current study builds on recent work in this area by examining the association between intelligence and self-control across multiple raters and when accounting for potential confounding influences not accounted for in prior research. Results based on a national sample of U.S. children indicates that higher scores for intelligence are associated with more self-control in both cross-sectional and longitudinal models, even when accounting for prior self-control, child executive functioning, maternal intelligence, and maternal self-control. Moreover, the association persisted across both teacher and mother ratings of child self-control. As such, these findings support and extend prior work examining the nexus between intelligence and self-control, and may explain why both traits are important for understanding success across a host of life outcomes in humans.

1. Intelligence and life success

In the wake of Spearman's century old observation that a single latent trait seemed to explain the inter-correlations between multiple cognitive domains, research on the topic of general intelligence has exploded (Deary, Penke, & Johnson, 2010; Jensen, 1998; Ritchie, 2015; Spearman, 1904, 1927). Decades of psychometric work have yielded increasingly precise measures of intelligence that are linked to a range of important life outcomes. Everything from health (Batty, Deary, & Gottfredson, 2007; Gottfredson, 2004; Luciano et al., 2010; Schou, Østergaard, Rasmussen, Rydahl-Hansen, & Phanareth, 2012), and mortality (Batty et al., 2009; Batty, Wennerstad, Smith, Gunnell, Deary, et al., 2007; Whalley & Deary, 2001), to occupational and career success (Gottfredson, 1997, 2003) has correlated with indicators of general intelligence.

Antisocial behavior and criminal activity are also no exception to the reach of intelligence, as variation on intelligence scores consistently correlate with tendencies to break the law and violate social norms (Herrnstein & Murray, 1994; Hirschi & Hindelang, 1977; Lynam, Moffitt, & Stouthamer-Loeber, 1993; Moffitt, Gabrielli, Mednick, & Schulsinger, 1981; Raine et al., 2005). Beaver, Schwartz, et al. (2013), for example, used a nationally representative sample to demonstrate that the IQ-crime relationship persisted even when utilizing a conservative measure of criminal behavior, for all race and gender subgroups. Moreover, low intelligence, in conjunction with a history of violence, has been found to account for racial disparities in arrest and incarceration rates (Beaver, DeLisi, Wright, Boutwell, Barnes, & Vaughn, 2013). In short, the relationship between intelligence and life outcomes (both legal and illegal) appears well supported.

Concurrently, researchers across several disciplines have produced a large body of evidence suggesting that another construct— self-control—also appears closely connected to general success in life, including engaging in prosocial behavior (and avoiding antisocial behavior), as well as accruing wealth and achieving economic stability (Gottfredson & Hirschi, 1990; Moffitt, Poulton, & Caspi, 2013; Moffitt et al., 2011; Pratt & Cullen, 2000). The ability to self-regulate impulsive desires represents a host of executive functions, including emotional, attentional, and inhibitory control, and the ability to pursue long-term goals (Bridgett, Oddi, Laake, Murdock, & Bachmann, 2013; Duckworth & Carlson, 2013; Gottfredson & Hirschi, 1990; Posner & Rothbart, 1998, 2007). Like intelligence, self-control has been used to explain similar life outcomes ranging from health and wealth, to crime and various forms of antisocial behavior (Moffitt et al., 2011; de Ridder, Lensvelt-Mulders, Finkenauer, Stok, & Baumeister, 2012).

* Corresponding author.
E-mail addresses: rmeldrum@fiu.edu (R.C. Meldrum), petkovsek@ucmo.edu (M.A. Petkovsek), boutwellb@slu.edu (B.B. Boutwell), jacob.young.1@asu.edu (J.T.N. Young).

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2. The intersection between intelligence and self-control

What is also becoming clear is that when pitted against one another as predictors of life success, both constructs—intelligence and self-control—remain relevant across long swaths of development. For example, Moffitt et al. (2011) found that low self-control in childhood was a predictor of a wide range of negative life outcomes for adults, independent of intelligence, social class, or family life. Physical and mental health, money-management and socioeconomic status, and criminal convictions were all significantly associated with self-control. Remarkably, variation in self-control predicted outcomes in adulthood about as well as intelligence and poor socioeconomic status in childhood. Other researchers have also reported evidence that self-control and intelligence are both associated with measures of academic achievement (Duckworth, Quinn, & Tsukayama, 2012). Specifically, intelligence accounts for changes in standardized achievement test scores over time, while self-control has been found to be more strongly associated with school grades. Duckworth et al. (2012) concluded that intelligence may influence an individual's ability to learn and solve problems independent of whether or not they receive instruction, yet self-control facilitates achievement by contributing to an individual's ability to study (a task which requires focus and allocation of time), complete tasks and assignments, and the tendency to take an active role in classroom participation.

Given the consistent importance of both intelligence and self-control for a variety of outcomes, researchers have considered whether one phenotype might directly impact the development of the other. In particular, scholars have argued that variation in levels of intelligence might impact individual variation in levels of self-control (Bridgett et al., 2013; Shamosh et al., 2008). In this regard, empirical research has indicated that intelligence may influence the development of self-control, detectable even in childhood. Studies of this nature began appearing in the literature nearly 25 years ago (e.g., Lynam et al., 1993), and research continues to focus on the link between intelligence and self-control today (e.g., Berg et al., 2014; Boisvert, Stadler, Vaske, Wright, & Nelson, 2013; Petkovsek & Boutwell, 2014). For example, Petkovsek and Boutwell (2014) found that higher scores on indicators of intelligence were associated with greater self-control in children when the two constructs were assessed at the same time. In a similar manner, other research finds that intellectual achievement accounts for later variation in levels of self-control during adolescence (Boisvert et al., 2013). Moreover, research examining delay of gratification—a key component of self-control—has linked it with intelligence in children (Mischel & Metzner, 1962) and adolescents (Funder & Block, 1989). Despite this accumulating evidence, there are important caveats regarding many of the studies that have assessed the potential influence of intelligence on self-control. Such concerns, detailed below, prompt additional research and guide the goals of the current study.

3. The current study

Intelligence and self-control represent two of the most important correlates of life success. Examined separately, deficiencies in either trait are associated with deviant and antisocial behaviors, as well as low achievement in one's career and personal endeavors. The overlap among the life outcomes and cognitive skills associated with both intelligence and self-control suggest that one trait may have a direct impact on the development of the other (Boisvert et al., 2013; Lynam et al., 1993; Petkovsek & Boutwell, 2014), but additional research is required before more definitive conclusions can be inferred. Specifically, while prior work suggests intelligence may influence self-control, the current study represents one of the few attempts to examine the longitudinal association between the two constructs; most studies have examined the association using cross-sectional data (e.g., Berg et al., 2014; Lynam et al., 1993; Petkovsek & Boutwell, 2014; but see Boisvert et al., 2013).

In addition, the current study examines this association using multiple informants to measure child self-control and when accounting for a range of key covariates. Specifically, we make use of both teacher and mother reports of child and adolescent self-control in order to assess the robustness of the association between intelligence and self-control. Further, we account for important covariates (i.e., maternal intelligence, maternal low self-control, and child executive functioning), and consider whether the association between intelligence and self-control remains when controlling for prior self-control. Accounting for such variables is critical given their known associations with both intelligence and self-control, yet we are unaware of any prior work that has accounted for each of these potential confounding influences within the same study. Thus, the current study provides a number of important advances over prior work and provides a rigorous assessment of the potential influence of intelligence on self-control. Furthermore, it is important to note that, given the heightened awareness of the need to replicate prior work in the psychological sciences in recent years (Open Science Collaboration, 2015; Ritchie, Wiseman, & French, 2012; Schmidt, 2009), the opportunity to further examine extant findings in a more rigorous manner with new data is a critically important enterprise.

4. Methods

4.1. Data

Data for this study were drawn from the National Institute of Child Health and Human Development's Study of Early Child Care and Youth Development (SECCYD), which was conducted from 1991 through 2007. As detailed below, these data are well suited to assessing the short and long-term association between child intelligence and self-control. In particular, they enable us to temporally distinguish our key variables: child intelligence was assessed during fourth grade, while child self-control was assessed by teachers during fourth grade, fifth grade, and sixth grade and by mothers at fourth grade, fifth grade, sixth grade, and at age 15. Further, key background variables, including maternal intelligence, maternal low self-control, and parental socialization, were assessed prior to the measurement of child intelligence.

Study families were originally recruited for inclusion in the SECCYD at hospitals in ten cities that were selected after the lead investigators reviewed applications submitted by researchers at major universities across the continental United States. The sites were selected on the basis of the quality of the applications received, and although the data cannot be considered nationally-representative, the selected sites represent a diverse set of cities: Little Rock, AR; Irvine, CA; Lawrence, KS; Wellesley, MA; Philadelphia, PA; Pittsburgh, PA; Morganton, NC; Charlottesville, VA; Seattle, WA; and Madison, WI.

Of the families eligible for inclusion, 3015 families were conditionally randomly sampled based on recent births at hospitals in the ten cities. These families were contacted for an interview two weeks after the birth of the target child,[1] but some could not be reached or refused to participate, while others experienced circumstances that interfered with participation (e.g., the child remained in the hospital for an extended period). The total number of eligible families willing to participate was 1526. One month after the target child's birth, 1364 (89%) families completed the first interview and were enrolled in the long-term study. Over the next 15 years, data were collected from the parents (most often mothers), the child, teachers, and others, with the last data collection period occurring when study children were 15 years old. For the current study, we utilize data up to and including the age 15 assessment period.

As is true with any longitudinal, multi-site study, some families dropped out, and both wave and item missing data were evident. Of

[1] The conditioning assured representation (at least 10% marginally) of single parent households, mothers with less than a high school education, and ethnic minority mothers.

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