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Florczak, Christoffer Koch

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Research Article

Revisiting Our Assumptions About the Nature of Man: Insights and Implications of Behavioral Genetics for Behavioral Public Administration

Christoffer Florczak *

Abstract: Behavioral public administration was coined as a term to describe a field focused on the psychologically based study of individual level behavior and attitudes with relevance for the public sector. Although it holds important insights on human behavior, the literature on behavioral genetics has so far largely been missing in this field. In this paper, I propose that behavioral genetics is concurrent with the scope of behavioral public administration and that it complements the popular theory of bounded rationality. Next, I outline the logics of the twin studies that underlie much of behavioral genetics, and synthesize relevant existing results both inside and outside public administration that relies on behavioral genetics. Functionally, I arrange these insights as they relate to citizens, employees, and managers and present examples of how gene-environment interactions allow for integration of behavioral public administration and behavioral genetics. I argue that insights from behavioral genetics are needed to maximize explanatory power and avoid biased estimates of the effects of socialization when examining these three groups. I conclude by presenting points for practitioners.

Keywords: Behavioral genetics, Twin studies, Individual differences, Socialization

The formalization of behavioral public administration (BPA) as a sub-field has helped redirect public administration towards relevant theories and issues that were until recently underemphasized in the literature. The re-focusing of the literature towards micro-level individual behavior and attitude formation, reliance on psychological theory, experimental methodology, and integration of insights from other behavioral sciences has given valuable insights for academia and practitioner alike (Grimmelikhuijsen et al., 2017; Tummers et al., 2016). The field took great inspiration from Dahl, who more than 70 years ago noted that: “(...) *much of the claim to a science of public administration derive from assumptions about the nature of man that are scarcely tenable at this late date*” (Dahl, 1947, p.4.). At this much later date, BPA has yet to fully grapple with one of the most literal notions of a “nature of man” and as such still operates mostly with the de-facto implicit assumption of a purely social human being at its core. Since Dahl’s observation, the field of behavioral genetics (BG) (McGue & Bouchard, 1998; Plomin & Asbury, 2005) has made significant advances which suggest that this assumption is scarcely tenable. As a result, this literature gives rise to profound insights and implications for a broad range of social phenomena that has so far been mostly overlooked by BPA and public administration at large. The aim of this paper is therefore first to add to the diverse theoretical and methodological toolkit of BPA by introducing BG and summarizing select relevant results for BPA. Second, the aim is to argue that updating our priors about human beings is not only helpful, but necessary, if we want our literature to assist in fostering public sectors that promote efficiency as well as equality to the highest degree possible.

It is in many ways surprising that the majority of the insights from BG have eluded the BPA community not least because of the potentially great synergy between the two literatures. BG is aimed at understanding the deep antecedents of individual level behavior and attitudes. BG seeks to answer a broad range of questions

*Aalborg University

Address correspondence to Christoffer Florczak at ckfl@dps.aau.dk

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which are of great relevance to the public sector and has thus also been sought answered in the public administration literature. These include, but are not limited to, questions of why some individuals are in greater need of help from society (Rowe et al., 1999), why some employees rise from the ranks to become managers (Arvey et al. 2006), and why some individuals hold attitudes or traits of value for achieving organizational goals (Judge et al., 2012). It is therefore not uncommon to see BG methods in general psychology, organizational psychology, and management studies, where they contribute to the explanation of human individual differences by examining to which extent such phenomena are grounded in biological and social processes. If the aim of BPA is to build on knowledge from the psychological sciences, there are few better places to start than one of the literatures that may have had the strongest influence on psychology's understanding of traits and behaviors in the last 50 years (Bouchard, 2004; Bouchard & McGue, 2003; McGue & Bouchard, 1998).

Established BPA scholars might be reluctant to consider behavioral genetics on the grounds of another strong model of human behavior that has also been dominant in the last 50 years. Cognitive psychology and behavioral economics have brought much explanatory power to BPA with the introduction of many studies of cognitive biases (Battaglio et al., 2019) and the emphasis on the bounded nature of human rationality also found in the classics of the field such as Simon (1947). Fortunately, such reluctance would be misguided as results from BG studies of human behavior can be integrated with for instance the cognitive bias, risk propensity, and discounting literatures (See for instance: Anokhin et al., 2011; Shikishima et al., 2015; Simonson & Sela, 2011; Wallace et al., 2007). Behavioral genetics does not contend that we are as individuals cognitively bounded, but it does add two important insights. First, it would show, rather than assume, that human boundedness can arise both because of social processes and of biological processes. Second, it will help to explain why not all individuals are equally bounded in all aspects - an observation too often neglected. Therefore, this is not an exercise in breaking established paradigms but rather in expanding and grounding current theoretical accounts of human behavior.

Lastly, one of the most frequently used methods in BG is the naturally occurring experiment of twinning (Segal, 2010). Twin studies allow for the control of, and attribution of variance to, genetics when trying to explain social phenomena. The highly experimental nature of the field is therefore also a near-perfect match, and behavioral genetics is therefore concurrent with all the major tenets of behavioral public administration as described by Grimmelikhuijsen et al. (2017). With the recent advances in measuring genes and deriving their effects observationally in large scale samples the conclusions of the field are being supported by methodological triangulation.

The Methods of Behavioral Genetics

Although scholars of BPA are no strangers to diverse methodology from fields foreign to the administrative sciences, most researchers would likely find the methods of BG more foreign than many others borrowed from psychology. The core of BG has been developing methods to measure the impact of a genotype, being an expression of an individual's genetic makeup, on a given phenotype, the observable characteristic or behavior of interest (Harden and Koellinger, 2020). The obvious difficulty from a social science perspective is how to measure the genotype. Three methods are currently dominating the literature. These methods are twin studies, adoption studies, and Genome Wide Association Studies (GWAS). The twin designs have been the most widely used method, and it is therefore likely to be the most pragmatic starting point for the study of public administration phenomena through the lens of BG (see: Christensen et al., 2020; Florczak et al. 2022).

The ability to measure genetics has recently improved drastically. The method behind the GWAS studies involves the mapping and analysis of DNA sequences, which allows for finding associations between single nucleotide polymorphisms (SNP) and the phenotype of interest (Harden and Koellinger, 2020). However, most complex human phenomena are highly polygenic in nature, meaning that they are a result of a large number of single genes or gene clusters. Effects are therefore very small and large samples are needed to systematically detect them (Chabris. et al., 2015). Although it is probably the method at the forefront of the field, it is unlikely that this approach can be widely applied to BPA phenomena in the near future due to costs and practical constraints. The primary focus of this methods section will therefore turn towards twin studies, as they have already been employed in the literature. For a review of the adoption literature, see Palacios and Brodzinsky (2010).

Two recent studies have employed twin methodology within public administration (Christensen et al., 2020; Florczak et al. 2022), and as such this approach proves a fruitful avenue for starting BPA research with insights from genetics. Three twin designs underlie much research in BG. These are the “discordant” twin-design, the “classic” twin design, and the “identical twins reared apart”-design (Segal, 2010). Common to all three approaches is that they rely on the use of identical twins, who are close to 100% genetically identical. This is because identical twins are conceived by the fertilization of one egg by one sperm cell, which then randomly splits into two after conception, leaving both eggs with the same genetic material. The discordant twin design uses this fact to effectively control for genetic confounding. Furthermore, the twins are born into the same family at the same time and are therefore equally subjected to many parental rearing and childhood environment effects. By choosing instances where two identical twins from the same pair are subjected to different social environments or interventions and seeing how that affects the phenotype of interest between them, the researcher can effectually control for confounding by genetics and early life socialization. However, the design is incapable of attributing variance in the phenotype to the genotype as it remains a constant.

The classic twin design is the most widespread and can be seen as an extension of the logic behind the discordant twin design (Florczak et al., 2022). However, the classic twin design incorporates fraternal twins as well. Fraternal twins are conceived when two different eggs are fertilized by each their own sperm cell. As such, they share on average 50% of their genetic material and are therefore no more alike than any other set of siblings. However, unlike regular siblings, they share the same family and childhood environment to the same degree as identical twins. The typical analytical method is the ACE model, which splits variance from the phenotype into three parts, A for Additive genetics, C for Common environment shared between the twins, and E for unique Environment not shared between the twins. In modern SEM approaches to twin modelling, the equal environments assumption means that the C component is constrained to 1 for both groups. A is observed as the on-average correlational difference between identical twin pairs and fraternal twin pairs. However, as the average difference in genetics between the two types of twins is only 50% the attributed variance is doubled. By deduction, all remaining variation in the phenotype is due to the unique environment.

The classic twin design came under some critique due to the equal environments assumption. Scholars noted that identical twins might be treated more similarly by parents compared to fraternal twins, thereby biasing the ACE model. The consequence of such a breach is potentially severe for the classic twin model as it can lead to an overestimation of variance attributed to genetics and an underestimation of environmental attribution. Indeed, the assumption was violated in some cases pertaining to variables such as clothing and sharing a room during upbringing (Kendler et al. 1987). However, in other areas such as political and value transmission the assumption seemed to be relatively robust, and often of lesser concern when violated (Smith et al., 2012; Hatemi et al. 2010; Hatemi et al., 2009). In an effort to solidify the twin methodology, researchers focused their attention on the identical twins reared apart design (Tellegen et al., 1988; Markon et al., 2002; Segal 2012; Segal et al., 2015; Zhou et al. 2015). This design combines the twin method with adoption to circumvent the possible issues related to twins growing up in the same environment. By studying identical twin pairs separated at birth and reunited later in life equal environments internally in a twin pair would not need to be assumed. Rather, the identical twins reared apart design separates only social and genetic influences. The underlying logic is, that differences between the twins must come from environment and similarities from genetics. Identical twins reared apart studies carried out across a wide range of outcome variables find heritability estimates in roughly the same ranges as those derived from classic twin designs¹. Although breaches to the equal environments assumption can still be a problem in specific instances of the ACE model, the results from the identical twins reared apart literature cautiously support the validity of the classic twin study.

Another critique often leveraged at classical twin models is the issue of assortative mating. The primary critique is that an implicit assumption of the classic twin design is that parents are randomly paired on genotype

¹ It is worth noting the circumstances under which a few examples of these data were brought about. First, in one extreme and extraordinary case, researchers and an adoption agency purposefully split twin pairs (for an in-depth discussion, see: Segal, 2015), directly affecting the lives of their subjects likely beyond what can be considered ethical, and the results were locked away until 2065 prohibiting participants from seeking out information collected on them. Secondly, some studies use twins who were split through adoption due to for instance single child policies. Careful consideration of the ethical implications of human study subjects and their conditions must remain high priority

which would create a genetic correlation between them of 0. Research does suggest that this assumption is rarely met as pair-bonding is naturally non-random. For twin studies it means that the genetic component is often underestimated, contrary to what was the issue for violations of the equal environments assumption. However, extended kinship studies, which includes data on, for instance, parents or full siblings of twins, can be applied to test the impact of assortative mating (See for instance: Hatemi et. al. 2010). Hatemi and colleagues' study suggests that possible violations of this assumption is less of an issue for political variables and simpler twin methods may be relatively robust to violations.

For the public administration scholar unfamiliar with SEM modeling, but interested in applying twin study methodology akin to the classical twin model, a viable alternative exists in the DeFries-Fulker model (DeFries & Fulker, 1985). DeFries and Fulker show, that the ACE model can be adequately adapted to a standard OLS framework, and this framework can furthermore be extended to easily include classic social science variables in a manner that is easily interpretable from a purely social science standpoint. However, one should be aware that while mixing the models is uncomplicated from a technical perspective, it may complicate interpretation from a BG standpoint as many of the included variables will themselves be partially a result of genetic processes, obscuring the purpose of separating variance into environmental and genetic components. For a nuanced discussion of implementation and consequences of the DeFries-Fulker model within social science, see Smith & Hatemi (2013).

Insights from Behavioral Genetics

This section will start by exploring how to theoretically link BPA research with the BG literature. It will then move on to summarize research results from the twin-based literature as it is likely to be the main method employed in public administration research for the time being. The results will be focused on the three groups of special interest for BPA highlighted by Grimmelikhuijsen et al. (2017, p. 1), E.g.: "*citizens, employees, and managers within the public sector are the unit of analysis*". Although BG has only very rarely focused specifically on individuals within the public sector, there are sufficient studies of citizens, employees, and managers in general to draw insights from. These insights can highlight the relevance of the field for BPA and help serve as a platform from which to launch future inquiry. Three overall points will emerge. First, genetics play a vital role in determining who needs the services of the public sector. Second, a wide array of employee phenomena is influenced by heritability, thereby implying that attraction-selection-attrition mechanisms are likely an unavoidable part of human resource management in public administration. Third, both leadership role occupancy and leadership styles are influenced by individual differences in genetics, and as such leaders are both 'born' and 'made'. These points play into central debates already prominent in the administrative sciences. For instance, classic work such as McGregor's "*The Human Side of Enterprise*" (1960) highlighted differing notions of what constitutes human nature. It then argues that humans have inherent psychological needs that organizations and leaders must design their institutions and decisions around, which inspired similar debates in public administration (O'Toole & Meier, 2009). By integrating this perspective with the knowledge from BG that human individual differences in psychological needs are likely related to genetics, we can reinforce the perspective that organizations and managers must account for individual differences in human nature with biological evidence.

Before turning the attention towards directly integrating BPA and BG, there are several results to incorporate into BPA from the neighboring literature of political science, where the methods of BG have already been heavily applied (Medland & Hatemi, 2009). A burgeoning literature has shown that key political variables such as ideology and party identification are substantially influenced by genetics in studies in different country context (Alford, Funk, & Hibbing, 2005; Hatemi et. al., 2014; Hibbing, Smith, & Alford, 2013; Fazekas, & Littvay, 2015; Smith et. al., 2012; Hatemi et. al., 2010; Hatemi et. al., 2009) and it is therefore reasonable to expect that genetics affects administrative phenomena at least through its effects on the political sphere. First, as the BPA literature is also concerned with studying what makes citizens accept different types of policies (Banerjee, Savani, & Shreedhar, 2021) and support government programs (Nicholson-Crotty, Miller, & Keiser, 2021) it may be fruitful to incorporate BG methods to strengthen the explanatory models of policy approval within BPA. Secondly, bureaucracies are naturally politically governed institutions, and the effects of political decisions will invariably spill over into the implementation phases thereby affecting classic BPA phenomena.

Bridging the Gap from Behavioral Genetics to Behavioral Public Administration: The Interplay Between Genes and Environment

To properly bridge the gap between the BPA and BG literatures the cumulative nature of research in BG should be considered (Verhulst & Hatemi, 2013). An initial step in introducing BG to an area of study is usually controlling for genetic confounding on phenotypes important to the field through discordant twin designs and establishing baseline heritability estimates through classical twin designs. This process is important in determining where to apply more advanced designs to investigate interactions between genes and environment, where field specific theory can be fully integrated. The initial BG contributions to the public administration literature has taken these initial steps (Christensen et al., 2020; Florczak et al., 2022). Other public administration phenomena with clear individual components such as cocreation/coproduction (Voorberg, Bekkers, & Tummers, 2014), tolerance of administrative burdens (Christensen et al., 2020), citizen expectations towards public services (Hjortskov, 2020) or citizen engagement with local government (Hugg, & LeRoux, 2019), and susceptibility to nudging (see for instance: Vainre et al. 2020) would be ideal targets for these kinds of studies. To the best of the author's knowledge genetic components have so far not been established for these phenotypes of special interest to BPA.

Going beyond establishing base heritability estimates, the BPA literature can also be advanced by including the gene x environment interaction interpretation into its models (See for instance: Harden & Koellinger, 2020). Unfortunately, many researchers may think rather deterministically about the effects of genetics and simplify the relationship between genes and environmental outcome. Among a few rare examples of single genes having large impact is Huntington's disease which is 100% heritable as it is caused by a single faulty gene passed on by a parent. However, in the vast majority of cases genetic effects on complex traits such as human behavior are probabilistic in nature with many genes or many gene clusters working together to create a higher probability of a given phenotype, hence genetic predisposition. Furthermore, genes and the environment interact so that effects of genetics are dependent on the social environment in which it manifests. While BG contributes to the BPA literature, BPA and the wider public administration literature are therefore contributing as much to BG as the domain specific knowledge from each subfield of for instance bureaucracy theory (Olsen, 2006) or public sector HRM (Boselie, Van Harten & Veld 2021) can help produce expectations about how genetic effects play out under differing environments. Additionally, BPA theory will be highly useful in answering the question of how to design systems and institutions that can account for individual genetic variation, as affecting genetics is not a feasible solution. First, this is because the effects of any one individual gene are very small, and it would take changes in many hundreds if not thousands of genes, making the genetic manipulation highly complex (Chabris. et al., 2015). Second, many genes are pleiotropic, meaning that they affect multiple phenotypes, and so even if genes could be changed, it would likely have unforeseen consequences for other social phenomena. As such, changing the biological side of the equation is likely both a futile endeavor as well as ethically questionable and we should return to administrative theory to search for answers on how to deal with genetic predisposition.

Heritability should not be viewed as static, but rather as something that can vary over time in a given population, across geographical place in another population, or between different sub-populations due to the interaction with the environment. Analyses of heritability are therefore best thought of as a snapshot of the current influence of genetics on a given phenotype in a given population. Large scale societal changes can therefore affect the heritability of different phenomena. One of the dominant ideas about the interactions between genes and environment is found in the Scarr-Rowe hypothesis (Rowe et al., 1999; Scarr-Salapatek, 1971). The basis for the hypothesis is the observation that the heritability estimates are larger when studying affluent populations. This led to the more general interpretation, that when an environment exerts higher degrees of pressure on parts of a population, their genetic predispositions will have a harder time expressing themselves. There is even some evidence that this might be the case between societal forms, where more meritocratic or free policies or institutions produce higher heritability estimates in, for instance, education (Rimfeld et al., 2018). A similar observation has been made using gender differences in heritability towards educational attainment, where the impact of genetics on educational attainment gradually increased for women as many of the formal barriers to equal participation were lessened (Herd et al., 2019). If it is an aim of public

administration research to support equality and equity for citizens in general or differing kinds of marginalized groups (Guy & McCandless, 2012) through creation of robust institutions, then the methods of BG may afford us an unexpected way of examining how inequality in social variables impact individuals (Harden, 2021).

However, gene-environment interactions are not the only way that genes and environment affect each other (Duncan et al., 2014). Gene-environment correlations should be of just as much concern to the social sciences and indeed the BPA community. The gene-environment correlation phenomenon takes the point of the attraction-selection-attrition hypotheses even further and suggests, that there are multiple ways in which genes affect the environment that an individual inhabits (Plomin, Defries, & Loehlin 1977). The classical examples by Plomin, Defries & Loehlin (1977) follows educational development in children and therefore an area directly relevant to public service delivery. First, passive gene-environment correlation is related to how a child inherits both genes and environment from their parents, in this case meaning that children who have parents with genes that predispose them more towards higher (or lower) performance in the educational system may also inherit a familial environment with more (or less) stimulation conducive of educational performance. Second, reactive gene-environment correlation refers to how actors in the environment might treat an individual with certain predispositions differently from another, for instance how an academically genetically predisposed child may get more challenges and opportunities to develop from teachers. Third, active gene-environment correlation describes a situation where a child actively seeks out environments in line with their predisposition, such that a child who does less well in school seeks out other children who also struggle with the same issues. As such, the environment does not solely and exogenously impact the individual, but the individual also impacts the environment and “teaches” the environment how to treat it. Several lessons of relevance for the BPA community can be derived. First, the call for more experimental work in BPA (Grimmelikhuijsen et al. 2017) is further warranted because of the possible confounding of gene-environment correlations, and studies relying on observational data should incorporate the notion of gene-environment correlations into their explanatory models and as sources of bias. Second, when controlled experimental variation is not possible, the biologically informed designs from BG such as extended kinship models may be a fruitful way to limit or assess the impact of gene-environment correlation (Verhulst & Hatemi, 2013; Hatemi, 2013), and as such the BPA literature should work towards incorporating such models after establishing base correlations using classical or discordant twin models.

Citizens

Primary education is one of the most vital services provided by public sectors to the citizenry. Due to the importance of educational achievement for individuals’ life outcomes, educational attainment, and by extension intelligence, has also been frequently studied in BG (See for instance: Silventoinen et al. 2020; Harden, 2021). A considerable portion of variation in educational outcomes such as educational attainment and grades are attributable to genetic factors. It is therefore likely, that genetics is an important source of unexplained variance in much current public administration research relying on individual level pupil or school data. As noted above, education of children is a prime example of where both gene-environment correlations and gene-environment interactions can take place. Arguments have been made as to how public and private schools might function differently (Andersen, & Serritzlew, 2007), which could form theoretical ground to examine possible gene-environment interactions or correlations using an extended kinship twin design. It could be the case, that private schools that can cater to specific political, religious, societal, or alternative teaching philosophies could give children the ability to maximize the impact of genetic predisposition on their educational outcome. It could also be the case that cream skimming effects may result in selection akin to gene-environment correlations which may negatively impact equality or equity concerns in line with the Scarr-Rowe hypothesis.

The healthcare system is also an area heavily influenced by genetics. It has by now entered the realm of common knowledge that diseases can be genetically heritable, and genetic tests are already being applied to screen for heightened risks of a wide variety of diseases, which has led to a development of a literature on the ethics of genomic data (Foster, Royal & Sharp 2006). Data on genotypes may be the most personal datatype yet, and administrative scholars concerned with the distinct ethics of public sector management (Goss, 1996) must eventually engage with this new source of ethical debate. On the one hand, genetics may be a key to high predictive power in a wide array of behavioral outcomes, and on the other hand, administrative scholars must be acutely aware of issues surrounding misuse and privacy. Furthermore, we now know that a wide range of

behaviors, which increase the likelihood of needing medical attention, if not the likelihood of encountering social services or the more authoritative branches of the public sector, have been shown to be partially heritable (See for instance: Kendler et al. 2015; Rhee & Waldman 2002). These include alcoholism, drug abuse, obesity, smoking, risk prone behavior, and engaging in anti-social or violent behavior. There is therefore a multitude of possible ethical dilemmas to engage with before technology allows for cheap implementation of genetic modelling for wide-spread use.

Another substantial service area in the public sector is that of eldercare. As most practitioners will likely attest, there is considerable variation in how much care any given citizen requires. Whereas life history factors undoubtedly matter for individual care needs, recent advances in BG suggests that genetics also play a major role in the decline of mental and physical faculties as citizens grow older (McGue & Christensen, 2001; Christensen et al. 2001). Genetics may therefore be an important predictor of which citizens will require most resources in terms of elderly care. ‘Individualized healthcare’ is currently applied in the hospital sector and may eventually be applied to, for instance, physical and mental decline in the elderly as well. This will open up new avenues for BPA inquiry into the psychological underpinnings of citizen interaction with genome-based technology and decision-making in public service delivery, as well as opportunities to study social interactions with and implementation of such technologies. Furthermore, it may allow front line personnel to be aware of high-risk cases and take necessary precautionary steps.

Table 1. Select Studies of Genetic Impact on Citizen Phenotypes

Scholars	Phenotype	Method	Base Heritability Estimates
Zheng et al. (2019)	Achievement goal orientation (education)	Twin	24-33%
Baier & Lang (2019)	Educational attainment	Twin	41-44%
Branigan et al. (2013)	Educational attainment	Twin	40%
Silventoinen et al. (2020)	Educational attainment	Twin	41-44%
McGue & Christensen (2001)	Mental decline, elderly	Twin	26–54%
Christensen et al. (2001)	Hearing loss, elderly	Twin	40%
Kendler et al. (2015)	Criminal behavior	Twin	45-54%
Polderman et al. (2015)	Human traits generally	Twin	49%
Rhee & Waldman (2002)	Aggression	Twin adoption	32% 9% (non-additive)
Li et al. (2003)	Smoking initiation Smoking persistence	Twin	37-55% 46-59%

Employees

In the area of employees two recent studies showcase the relevance of behavioral genetics for behavioral public administration. The very first behavioral genetics based study in public administration seeks to answer a question of utmost importance to the study of public employees (Christensen et al., 2020). Investigating whether employment in the public sector is heritable, Christensen and colleagues find support for a genetic predisposition to public service job employment in a sample of US twins. Although the effect is modest, it does yield credence to the idea that public sector employees are to some degree distinct from others at a level beyond socialization.

Exploring the behavioral genetics of a concept truly home-grown in the public administration literature, Florczak et al. (2022) apply a classical twin design to data on public service motivation (PSM) from the Danish Twin registry. The analysis shows that PSM is not biologically predisposed. This finding is of substantial significance to PSM research. First, a problem haunting the PSM literature is the possible overlap with other concepts such as altruism or pro-sociality. These concepts carry considerable genetic components, and PSM may therefore be distinct from these concepts on this parameter. Second, by underlining the social nature of the phenomenon, the suspicion of genetic confounding of past empirical association can to some extent be dismissed. Third, PSM could be a more likely candidate for a manager to effectively cultivate in her employees than for instance personality due to the difference in heritability.

Additionally, a range of issues of broad interest to both public and private organizations alike have been explored. Job-satisfaction (Li et al. 2016), work-values and turnover are amongst the individual level phenomena showing a heritable component. For a recent review of organizational behavior broadly, see Arvey et al. (2016).

A core question in public administration scholarship has been what makes public administration different from other forms of administration (Boyne, 2002), and how differing management affects the two organizational types (Meier & O'Toole, 2011). This perspective opens up for a selection of possible gene environment interactions that could have relevance for the BPA community. As the section on leadership below indicates, leadership styles are genetically influenced human behaviors. But different leadership behaviors may themselves be considered as a contextual variable that some employees are more predisposed to being affected by. Twin methods may be able to give initial indications about how perceived leadership behavior relates to individual follower human resource behaviors and characteristics.

The methods of BG may also provide and possibly solve interesting puzzles if applied in relation to the literature on merit bureaucracy and civil service. The debate around merit vs political appointment has been a staple of the field since the time of Weber (1918) and has currently fostered a large literature on the possible politicization of civil servants. BG methods may be applied on civil servants across country contexts to assess the relative impact of genetics and environment in shaping, for instance, attitudes related to ethics, decision-making and work environment. On the one hand, it could be speculated that higher degrees of motivation or ideological proximity maybe mediating the effect of genetics on performance or implementation of policies and responsiveness. On the other hand, it could be that merit bureaucracy helps to constrain individual differences in the genetic predisposition towards differing behaviors due to the strong focus on norms, ethics and rules, thereby leaving a higher degree of genetic predisposition in highly politicized bureaucracies where people are selected based on their differing ideological proclivities.

Table 2. Select Studies of Genetic Impact on Employee Phenotypes

Scholars	Phenotype	Method	Base Heritability Estimates
Christensen et al. (2020)	Sector choice	Twin	“Minor”
Florczak et al. (2022)	PSM	Twin	0%
Mosing et al. (2012)	Flow proneness	Twin	41%
	Behavioral inhibition		45%
	Locus of control		30%
Li et al. (2016a)	Job satisfaction	Twin	18,7-31,2%
Arvey et al. (1989)	Job satisfaction	Twin	30,9%
	Intrinsic job satisfaction		31,5%
Arvey et. al. (1997)	Job satisfaction	Twin	27%
	Work values		35%
	Intrinsic job satisfaction		23%
	Extrinsic job satisfaction		0%
	General job satisfaction		16%
Ilies & Judge (2003)	Job satisfaction	Twin	29%
Melchers et. al. (2016)	Affective Empathy	Twin	52-57%
	Cognitive Empathy		27%
Maas & Spinath (2012)	Work engagement	Twin	44%
	Resistance to stress		27%
Li et al. (2016b)	Job demands,	Twin	28.6%
	Job control,		34.2%
	Social support at work		0%
	Job complexity		33.1%
McCall et. al. (1997)	Job switching	Twin	36%
	Occupational switching.		26%
Vukasović & Bratko (2015)*	Personality	Twin	47%
		adoption family	22%

Managers

The public administration and management literature has been home to biologically based theories on leadership prior to behavioral genetics. The work of Van Vugt (2011) is derived from evolutionary psychology, which on the one hand generally presupposes that genetic predisposition acts similarly across humans. Behavioral genetics on the other hand takes as its core objective to partition the variance in a phenotype from individual differences in genetics between humans, and thus the methodology is slightly different. Questions of particular interest to the management literature have also been answered by behavioral genetics. Chief amongst them is the fundamental conundrum of whether leaders are “born” or “made” (Johnson et al., 1998). This has been studied in two ways. First, leadership role occupancy has been assessed in several studies confirming a genetic component and a substantial contribution from the unique environment (for instance: Arvey et al. 2007; De Neve et al. 2013). Consistent with the attraction-selection-attrition hypothesis, studies suggest that personality mediates the relationship between genetics and leadership role occupancy (Arvey et al. 2006). Furthermore, women and men have equally high genetic predisposition towards leadership role occupancy.

Second, the BG literature fully acknowledges that there is more to leadership than merely obtaining a leadership position. Therefore, the heritability of leadership styles has also been investigated (Li et al. 2012). These have most frequently been transformational and transactional leadership. As with the formal occupation of a leadership role, there is also substantial heritable components to transformational and transactional leadership. Furthermore, substantial overlap in heritability estimates in leadership role occupation and leadership styles suggests that the same underlying genetics predispose towards both occupancy and transformational leadership. As with role occupancy, the link between genetics and leadership style seems to also be mediated by personality.

As was the case with employees, it can also be theorized that managers in the public sector operate under different conditions than do private sector managers. Meier and O’Toole (2011) hypothesize that public organizations are more focused on formal structure and stabilization, which in turn makes them more rigid and resistant to change for instance due to the political environment they are nested within. If it is the case that public organizations are more rigid institutionally than their private sector counterparts, it may follow that managerial authority is also limited along with decision-making capabilities. Following from this a gene-environment interaction hypothesis could be formulated suggesting that individual genetic predisposition towards leadership can be more easily expressed in private organizations than in public. Twin studies comparing leaders employed in the two sectors could thereby add to BPA’s knowledge of how the institutions of public and private sectors influence individual level leadership.

Heritability may change throughout a lifetime due to either life course events like aging or due to changes in environmental pressure (Friedman, Banich, Keller, 2021). Therefore, BPA can make use of twin data with temporal variation to estimate changes over time in heritability. It could, for instance, be hypothesized that an individual’s ability to ascent to a managerial position based on its predispositions could vary over time because of labor market structures so that the older or more experienced the individual, the higher the chance that one can rise in the ranks. If that was the case, studies would show considerably lower heritability during youth and early career, helping the BPA community to understand the conditions employees and leaders function under in modern labor markets.

Table 3. Select Studies of Genetic Impact on Managerial Phenotypes

Scholars	Phenotype	Method	Base Heritability Estimates
De Neve et al. (2013)	Leadership role occupancy	Twin	24%
Zhang et al. (2009)	Leadership role occupancy	Twin	32%
Arvey et al. (2006)	Leadership role occupancy	Twin	30%
Arvey et al. (2007)	Leadership role occupancy	Twin	32%
Li et al. (2012)	Leadership role occupancy Transformational leadership	Twin	29% 49%
Chaturvedi et al. (2011)	Transformational leadership	Twin	49%
Johnson et al. (2004)	Transformational leadership Transactional leadership	Twin	57% 47%
Johnson et al. (1998)	Transformational leadership Transactional leadership	Twin	59% 48%

Points for Practitioners

Rational compassion is key. It is often easy to understand and be sympathetic towards the citizen who experienced traumatic events or social hardship. It is arguably harder when there is no apparent social reason for the citizen's current predicaments. The BG literature teaches that not all reasons for human hardship is readily apparent, and as such practitioners should always seek to engage with citizens from a point of compassion regardless of social circumstances. Survey research suggests that people who are accepting of genetic explanations for human individual differences are also more accepting of vulnerable individuals (Schneider, Smith, & Hibbing, 2018). As such, the knowledge presented in BG research may be used to support rational compassion for typically marginalized groups both among front line staff and the public.

Public service failure is not always the fault of the public servant. Individual humans are different from each other not just for social but also for genetic reasons. Therefore, each citizen that the public servant is helping is even more heterogenous from the next than can be readily understood by examining social causes. As such, some cases are much harder than others to handle and we cannot currently know which due to technological and ethical constraints. For all the good intentions and attention awarded by the public servant, sometimes public service failure is the fault of no individual actor, but the fault of complexity beyond what can reasonably be expected to be accounted for by public sector front liners. However, the public sector can still be argued to have a normative responsibility to provide fair and equal provision of services to its citizens (Goss, 1996), and, therefore, must handle the knowledge, that citizens likely have differing possibilities of receiving help they are entitled to. Rules and institutions could be constructed so as to maximize equal access and prevent negative effects of the Scarr-Rowe hypothesis by, for instance, alleviating administrative burdens (Christensen et al., 2020).

Not all human traits that are organizationally advantageous are likely to be equally influenced by management practices. Cultivation and activation strategies are likely better used on phenomena with lower heritability estimates such as PSM or job-satisfaction rather than personality or IQ. Attempting to heavily influence highly heritable traits could result in employees feeling a worse person-organization or person-job fit

and increase turnover by a decrease in retention rate. Sometimes the human resource management battle may be easier won with the weapons of hiring and retaining than the weapons of norms and socialization.

Conclusion

If it is the ambition of BPA to follow Dahl's aspiration of an administrative inquiry grounded in "(...) *a development of a science of man*" (Dahl, 1947: p 7.), we must regularly revisit our core assumptions about humans and their behavior in the light of new evidence brought forth not only by our own field, but also by the myriad of other fields concerned with human behavior in general. When it comes to the most foundational assumptions for the social sciences, namely the assumption that what we study are truly social phenomena, we have hesitated to update our priors. The objective of this paper was to do just that for the BPA literature. While the debate on nurture vs nature rages on for human behavior, and discussions about this debate's implications is also refined and elaborated on, one empirical finding is quite clear. Only rarely does socialization or biology stand alone, and most social phenomena are therefore ultimately a result of an interaction between environment and predisposition. Therefore, we should by no means stop our inquiry into how social outcomes are determined by social inputs, as the BG literature consistently shows that environment plays a major part in most phenomena. We must, however, recognize that a nurture *and* nature perspective is more appropriate than a nurture only perspective if we seek to accurately describe and predict human behavior. BPA and public administration scholars at large should start to incorporate this insight and add a series of new questions and methods to our repertoire. These revolve around when, how and to what extent nature and nurture matter for public administration, and what that implies for citizens, employees, and managers in the public sector.

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