# Machiavellianism: Assessing the Relationship between Cortisol Response, Personality, and Life Experiences

Brianna N. Newport Psychology Department Bethel College North Newton, Kansas 67117 USA

Faculty Advisors: Dr. Dwight Krehbiel & Dr. Rachel Messer

#### Abstract

Recent studies show links between high Machiavellian personality (MP) traits, low salivary cortisol, and empathy. Those exhibiting high MP traits tend to use a bistrategic resource control strategy (BRCS; utilizing both prosocial and coercive strategies to obtain social resources), as well as have low physiological reactions to empathy. Cortisol responses are affected by familial interactions characterized by parental styles and investment (i.e., a parent's strategies, expectations, and amount of involvement). Additionally, decreased parental care and adverse family background are related to MP and Borderline Personality (BP) traits. The current study examines the relationships between parental styles and investment, resource control strategy, salivary cortisol response, and personality traits. Thirty-eight participants (31 females, 7 males) completed inventories regarding resource control strategy, personality, and retrospective parental perception. At the end of the survey, one of three randomly selected empathy-inducing videos was viewed between the collection of two saliva samples. High Machs do not have a significant relationship between warmth of father and cortisol response (r = 0.039, p = 0.894), while Low Machs have a near significant positive relationship (r = 0.401, p = 0.065). The analyses revealed that bistrategic resource control and desire for control (an MP subscale) had a stronger relationship (r = 0.382, p = 0.018) than BRCS and total MP traits. Warmth of the mother is related to prosocial (r = 0.323, p = 0.048) resource control. With respect to personality, BP traits negatively correlated with warmth of the mother (r = -0.334, p = 0.040), while desire for control positively correlated with father's warmth (r = 0.340, p = 0.037). These findings suggest that parental styles and investment have influence on an individual's own traits, and that there are complex links between perceived parental relationships, personality, and social strategies.

#### Keywords: Machiavellianism, Resource Control Strategy, Parenting

# **1. Introduction**

From an evolutionary psychology perspective, there are complex interactions between an individual's personality, such as introversion and extroversion, physiology, such as hormone release and growth, and life experiences, such as parental investment and childhood trauma. These factors not only include an individual's present state, but also development across the lifespan. Researchers have been analyzing these interactions to attempt to understand their various effects on individuals. For instance, our early life experiences can impact our developmental trajectory and thus, our current physiology, personality, and psychopathology, as demonstrated in psychiatric disorders such as PTSD and depression<sup>3</sup>. The current study is a follow up of research done by Dr. Amber Massey-Abernathy and Dr. Jennifer Byrd-Craven<sup>18</sup> at Oklahoma State University that examined these interactions. That previous study focused on skin conductance as a measure of physiological empathy, Machiavellianism, resource control, and paternal style. The current study aims to follow up on these relationships using a more accurate measurement of physiological empathy and other parental style factors

#### 1.1 Resource Control Theory

Resource control theory describes how successfully an individual can manipulate and gain access to resources<sup>12</sup>, which may be social, informational, and/or material. Examples of these resources could be anything from garments to survival items, such as food, to information to get a promotion. Though Hawley and colleagues have categorized five types resource control strategies, only three -- coercive, prosocial, and bistrategic controllers -- are examined in the current study. The other two types of strategies are non-controllers and typicals and are either not motivated by resources or score moderately on other strategies, respectively<sup>13</sup>.

Coercive controllers employ self-serving behaviors such as aggression, manipulation, deception, and exploitation. Hawley<sup>13</sup> outlines that despite the negative perception of these behaviors, even as young as preschool age, an individual effectively utilizing them will be considered powerful and socially dominant by the group and thus peers will be drawn to them. Prosocial controllers use strategies quite the reverse of coercive controllers. Their behaviors place emphasis on cooperation, reciprocation, and mediation<sup>13</sup>. To gain resources, an individual would do something to benefit another individual, resulting in a direct reward or the favor of the individual, regardless of the altruistic (selfless) nature of the act. The most effective controller is also the one who is perceived as socially dominant: the bistrategic controller, who employs both coercive and prosocial behaviors to their benefit<sup>12</sup>.

#### 1.2 Machiavellianism

Machiavellianism is a part of the Dark Triad, which are three subclinical traits -- Machiavellianism, Psychopathy, and Narcissism-- that society tends to associate with the darker side of human nature. All three have their distinct features, but are interrelated and linked with disagreeableness, dishonesty, and aggression<sup>16</sup>. Machiavellianism is specifically characterized by manipulativeness, cynicism, and a proclivity for opportunistic behavior to get what they desire<sup>9</sup>. On the subclinical continuum between high and low Mach behavior (Mach being the abbreviated term for Machiavellian), high Machs tend to be more likely to engage in unethical behavior as a means in which to achieve their ends<sup>17</sup>. Machiavellian individuals are coercive, deceptive, and exploitative in relationships.

High Machs (individuals who score high on Machiavellianism) may be better suited for the bistrategic resource control strategy. High Mach children (9-11 years old) display these behaviors. Boys will display direct and indirect aggression, but also display prosocial behavior such as inclusion of peers in the social group, while girls display more indirect aggression and intimate peer networks, such as being accepted by other social groups and manipulating inclusion and exclusion within their own group<sup>1</sup>. The implications of studies such as these highlight the early onset of some of these traits and social strategies.

Those that display high Mach traits may have problems empathizing. Empathy can be distinguished between affective empathy and cognitive empathy. Affective empathy is the ability to express an appropriate emotional reaction in response to another's emotions or otherwise referred to as emotional contagion - to "catch" emotions from others.<sup>7</sup> Commonly, high Machs display low affective empathy<sup>22</sup>, which is seen in the Dark Triad as well but is prominent in Machiavellianism. This is contrasted with having no change in cognitive empathy<sup>22</sup>, which is the ability to recognize another's emotional state without the emotional contagion<sup>10</sup>. Essentially, Machiavellian individuals can identify the emotions of others, but they are removed from the experience of another's circumstance on an emotional level.

#### **1.3 Cortisol Reactivity**

Cortisol response has been posited to be a better physiological indicator of empathy, as contrasted with the original study that used skin conductance<sup>18</sup>. Cortisol can be measured in two ways: cortisol awakening response and acute cortisol reactivity. Cortisol levels follow a circadian pattern, meaning that throughout the day there is a typical rhythm characterized by a 50-60% increase upon awakening and a steady decline throughout the day. That 50-60% increase is the cortisol awakening response or CAR<sup>2</sup>. CAR is also considered an indicator of a biological preparedness for handling stress<sup>15</sup>. Acute cortisol reactivity is the change in cortisol levels measured within seconds or minutes of some stimulus event, as was done in the current study.

Cortisol is released with activation of the hypothalamic-pituitary-adrenal axis (HPA axis), which is a fundamental stress response. Interestingly, this system is activated when we are not the person experiencing the stress. It has been found that when a speaker is experiencing a stress response, an observer will elicit a matching parallel stress response<sup>4</sup>. So, essentially, individuals feel stress in response to seeing another's stress, which is an empathic reaction.

# 1.4 Personality and Physiology

There are many ways that an individual's personality is intertwined with physiology. The current study is modeled after one that found high Machs to have normal self-report empathy but low physiological response in the form of skin conductance<sup>18</sup>. This relationship is sometimes found in Borderline Personality Disorder<sup>19</sup> (BPD) as well. Cortisol Awakening Response (CAR) has been found to be related to introversion, aggression<sup>2</sup> and low affective empathy<sup>15</sup>. There are also normative developmental changes in relationship to cortisol levels. For instance, cortisol reactivity increases during adolescence, particularly in females and in relation to puberty. Additionally, there are day-to-day changes in CAR after experiencing loneliness and sadness<sup>2</sup>. There are neurobiological underpinnings including brain structures, such as hyper-reactivity in the amygdala and anterior insula, hormonal and empathy dysfunction, such as oxytocin dysregulation and affective empathy, and much more to BPD<sup>19</sup>. Similar underpinnings have been related to callousness and antisocial behavior<sup>20</sup>.

# 1.5 Parents, Personality, and Physiology

Attempts have been made to examine intercorrelations among parental influence, personality, and physiology. For instance, the study on which this one is based found that a negative relationship with the father mediates a low stress response and high Mach traits<sup>18</sup>. It has also been discovered that both baseline cortisol and cortisol reactivity in social situations are heightened by a negative father-daughter relationship<sup>5</sup>. More generally, childhood stress and trauma affect the HPA axis, neurodevelopment, psychopathology and psychiatric disorders<sup>8</sup>. BPD is a psychiatric disorder in which these relationships have been extensively studied.

Neurobiological models of BPD empathic dysfunction emphasize the importance of developmental risk factors, such as childhood trauma, parental caregiving style and genetic predispositions. Many BPD symptoms result from these factors and are exacerbated by current empathy dysfunction and present day-to-day issues<sup>19</sup>. BPD exemplifies the inter-related nature of these factors. Models of the development of the disorder place emphasis on life experiences, both past and present, physiology, such as reactivity and impairment of brain areas, and personality traits, such as empathy. The current study is an examination of the relationships among cortisol, self-reported parental caregiving, and self-reported Machiavellianism.

## 1.6 Hypotheses

The accumulating information coming from these areas of study, as well as from the original study by Massey-Abernathy and Byrd-Craven<sup>18</sup> led me to the following hypothesize that individuals who score high on Machiavellianism, High Machs, will have little to no cortisol increase, but will score similarly for self-reported empathy scores. This would echo the original studies results, but with cortisol as an empathic marker. Additionally, the way a participant perceives the parenting they received, particularly regarding the father, will influence cortisol and Machiavellianism scores, as was shown in the previous study. The father was chosen as the original study and other literature focus on the father in the development of Dark Triad traits. High Machs will be more likely to use a bistrategic resource control strategy, as they may be predisposed to engage in either behavior due to the inherent traits of the personality.

## 2. Methodology

## 2.1 Participants

Thirty-eight (31 females, 7 males, age range 14-26+) participants were recruited for this study. Twenty-nine were Caucasian, five Hispanic/Latino, two Asian/ Asian American, one Middle Eastern, and one American Indian. Fifteen were high school students who were recruited either through Bethel College Summer Science Institute or social media. Twenty-three undergraduates were recruited via email or through a psychology course. The cortisol levels for two participants were unavailable. Each participant who completed the study was put in a drawing for twenty dollars.

## 2.2 Procedure

The survey was administered either in the psychology laboratories or within the participant's home if the participant could not make it to Bethel College. After consenting to the study, the participants completed a survey using Google Forms. At the end of the survey, one of three empathy-inducing videos were viewed between the collection of saliva samples via the passive drool method. Participants had completed once they finished the debriefing.

The videos were each approximately five minutes long and were randomly assigned to each participant. The purpose of the videos was to induce a physiological empathy response, which would be measured by salivary cortisol. Two of the videos were clips from movies "Legends of the Fall" and "Odd Girl Out", while the third was several video clips of crying babies. Theoretically, these different videos were to induce different forms of empathic stimuli: relational aggression, psychological pain, and empathy of a caregiver, respectively. The variations in empathy types are due to the content of the video and attempted to control for individual differences in empathy. The full rationale is laid out in the original study<sup>18</sup>.

Saliva samples were collected to analyze salivary cortisol. Samples were stored until all data had been collected, then transported to the Psychobiology Lab at Oklahoma State University (OSU) for analysis. Storage, transport, and running the assays were completed abiding by Salimetrics protocol (see materials). None of the data collection occurred at OSU.

## 2.3 Measures

Demographic Questionnaire – Sex, age, relationship status, ethnicity, and grade level were included on the questionnaire. The form was also comprised of self-report questions about well-being and social status, such as "Usually I am… popular". This Likert scale ranged from "Not at all" (1) to "Very much" (5).

Machiavellian Personality Scale  $(MPS)^{32}$  - This 16-item self-report scale measures the construct of Machiavellianism and its four dimensions: distrust of others, amorality, desire for control, and desire for status. An example item is "I believe that lying is necessary to maintain a competitive advantage over others". The Likert scale is from "Strongly disagree" (1) to "Strongly agree" (5).

Resource Control Strategy Inventory (RCSI)<sup>11</sup> - This 5-point Likert scale (strongly disagree (1) to strongly agree (5)) inventory assesses whether the participant is a coercive, prosocial, or bistrategic controller. An example item is "I gossip or spread rumors about others if I am mad at them". Coercive and prosocial controller scores were made based on the sum of two questions each. Bistrategic controller scores were determined by the sum of prosocial and coercive questions, as was done in the previous study.<sup>18</sup>

Six Dimensions of Parenting<sup>21</sup> - A modified version of Skinner's questionnaire was used to examine the relationship between the participant and each of their parental figures. The questionnaire covers six factors. Warmth, structure, and autonomy support were categorized as warm dimensions, while rejection, chaos, and coercion were the negative dimensions. Scores for the warm dimensions were totaled to create the variable "Perceived Warmth of Father/Mother" and the scores for the negative dimensions were totaled to create the variable "Perceived Negative Father/Mother". An example of an item is "My father encourages me to express my opinions even when he doesn't agree with them." This Likert scale is score as "Strongly disagree" (1) and "Strongly agree" (5)

Personality Assessment Inventory<sup>14</sup> - Borderline Features Scale (PAI-BOR) – 24 self-report items measure aspects of Borderline Personality (BP) pathology. In addition to a total Borderline score, there are four subscales that measure these specific features; affective instability, identity problems, negative relationships, and self-harm. The scores are measured on a 4-point Likert scale from "Strongly Disagree" (1) to "Strongly Agree" (5). An example item is "My mood can shift quite suddenly".

#### 2.4 Materials

Surveys were completed with Google Forms using either personal or laboratory computers. Inventories were chosen to match those administered in the original study. The cortisol assay kits were from Salimetrics (State College, PA), as were the SalivaBio Passive Drool kits and storage containers. The drool kit included cryovials and saliva collection aids. Various lab equipment was used at Oklahoma State University to run the assays. Lastly, R, Rcmdr, and RStudio were used for data analysis.

# 3. Results



Figure 1. Boxplot showing change in cortisol response between videos

The different videos were used to control the type of empathy that was to be induced. Using an ANOVA, there were no significant differences between the cortisol response to the video, as shown in Figure 1 (F (2, 33) = 0.530, p = 0.565). However, it is interesting to note that the "Legends of the Fall" (the war movie) promoted a slightly larger response and greater variability of response. Regarding the first hypothesis, between High and Low Machs there was no difference between self - reported empathy, as predicted. Interestingly, there was also no difference in cortisol response between High Machs and Low Machs.



Figure 2. Scatterplot showing the positive relationship between participants' perceived warmth of the father and the change in cortisol response

For the second hypothesis, there was also no relationship between Machiavellianism and the perceived warmth of the father. However, the relationship between perceived warmth of father and the response in cortisol was near significant in the positive direction (Figure 2; r = 0.316, p = 0.061). This means that the more warmly the father was perceived in the parent-child relationship, the more likely there would be a greater cortisol increase after viewing the empathy-inducing video. To explore this further, perceived warmth of father and change in cortisol were analyzed to examine the dependency on Machiavellianism. High Machs showed no change in cortisol response despite their father's warmth (r = 0.039, p = 0.894). However, Low Machs show a near significant relationship between the two variables (r = 0.401, p = 0.065), indicating that the Low Machs had a higher cortisol increase if they perceived their father more warmly. These patterns can be seen in Figure 3.



Figure 3. Scatterplot showing the different relationships between change in cortisol response and perceived warmth of father and their possible dependence on Machiavellian scores



Figure 4. Scatterplot showing the relationship between overall Machiavellian score and bistrategic resource control

The third hypothesis required more comprehensive analysis. Machiavellian scores had a small correlation that approached significance with bistrategic resource control (r = 0.294, p = 0.073), which does not entirely support the hypothesis. However, desire for control, a subscale of the Machiavellian Personality measure, had a fairly strong significant positive correlation with bistrategic resource control (r = 0.382, p = 0.018). This indicates that desire for control, rather than overall Machiavellianism, may be related to bistrategic control (Figures 4 and 5).



Figure 5. Scatterplot showing the relationship between the Machiavellian subscale desire for control and bistrategic resource control



Figure 6. Scatterplot showing the relationship between the perceived warmth of father and the subscale desire for control

Revealing the significance of desire for control prompted more analyses regarding the second hypothesis. There was a significant relationship between how warm a participant perceived their father to be and the desire for control subscale (r = 0.340, p = 0.037), as shown in Figure 6.



Figure 7. Scatterplot showing the relationship between perceived warmth of the participants' mother and prosocial resource control

Exploratory analyses were conducted for the perceived warmth of the mother. If a participant perceived their mother to be warm with them, then they were more likely to use a prosocial resource control strategy (r = 0.323, p = 0.048) and they were less likely to present Borderline Personality traits (r = -0.334, p = 0.040). These are shown in Figure 7 and Figure 8, respectively.



Figure 8. Scatterplot showing the relationship between perceived warmth of the mother and Borderline Personality traits

## 4. Discussion

Though Machiavellian scores had no significant relationships with the tested variables, with one exception, it was interesting to find that the subscale desire for control did. This indicates that specific Machiavellian characteristics might hold more weight than others regarding the relationships presented in the literature<sup>18</sup>. This especially holds true as what was found with desire for control parallels the patterns of relationships between Machiavellianism, cortisol, and relationship with the father. For instance, the literature suggests that Machiavellianism should present a relationship with bistrategic resource control and the perceived warmth of one's father, but this was not the case. Desire for control did, however, have relationships with those predicted variables. So, the results were similar to what has been found in the literature, but with the Machiavellian subscale desire for control, rather than total Machiavellian score. The distinction between these Machiavellian factors in the literature could give insight into how certain parental relationships affect specific personality traits.

The results also indicate that there may be an interaction between Machiavellianism, perceived father's warmth, and change in cortisol. The empathic cortisol response was unrelated to the father's warmth regarding the High Machs, which was not the case for Low Machs. Low Machs had an increased cortisol response with an increase in perceived warmth of the father. High Machs maintained a consistent cortisol change regardless of father's warmth. When perceived father's warmth is at its lowest, High Machs have a higher cortisol increase than Low Machs. The literature supports the finding that High Machs may be less influenced by the perceived warmth of the father. In addition, literature suggests that mothers are very influential in the development of BPD and prosocial behaviors. Prosocial behaviors are more likely to be employed by those with warm mothers, while BPD traits are expressed less often with warm mothers, which was reflected in our own data<sup>19</sup>.

The dataset for this study included many variables not pertaining to the results above, due to the massive number of inventories administered by the original study. There are an overabundance of constructs and traits that may be used to test the broad hypotheses regarding the parent-child relationship. The variables used were chosen due to what had been done in the relevant literature, specifically the original study<sup>18</sup>. Other variables that could have been used include, but are not limited to, ACEs (adverse childhood experiences), warmth, negativity, reactivity, etc. and could be examined in another analysis. Another limitation was that some measures provided limited variation in scoring that would not yield meaningful results, which was the case for self-reported empathy. Variation was also limited in my sample size, population, and the lack of a significant number of male participants.

It is important to note that often this research is conducted in a negative framework. There is a perception that studying Machiavellian traits at the subclinical level is a clinical diagnosis, thus deterring researchers from the study or encouraging these traits to be studied without using the correct label. Additionally, research in this field is often conducted in criminal or prison populations where there is a higher incidence of these traits, but are not very representative of a subclinical, "everyday", personality trait level Machiavellianism. Thus, it is difficult to guarantee external validity using the methods provided by much of the previous literature. External validity is also compromised by the Lastly, the research tends to focus on the negative impacts of parent-child relationships or personality traits, rather than taking a strengths-based perspective, as was done here.

A next step would be to examine gender differences and attachment styles regarding both empathic reactivity and parent relationships, which would include gathering a larger sample. It would be interesting to study the impact of the perception of the parent-child relationship and include parents' and third-party perceptions to examine variations and how differences could influence and individual's personality, physiology, etc. I also found in my analysis that there is more to understanding these relationships in terms of absentee parents when a previous parent-child relationship had existed. For instance, preliminary analyses had shown a positive correlation between warmth of father and the use of coercion, which is both counterintuitive and contradictory to the literature. Upon further inspection, several of the participants had absentee parents that were heavily impacting these correlations, because instead of proceeding to the next set of questions about the present parent, participants proceeded to answer the questions about the absent father based on the pre-existing relationship.

# 5. Conclusions

The main takeaway from the current study is that the relationships found in the literature regarding Machiavellianism and its relationships with physiological empathy and father's warmth are far more complex than previously believed. While the literature maintains that Machiavellianism has relationships with variables such as empathy, father-child relationships, and different physiological empathy measures, my results suggest that the subscale desire for control might be more influential amongst the relationships. Moreover, there are replicable results regarding the interaction between the warmth of the father and change in cortisol with dependence on Machiavellianism. Replicable results are also found regarding BPD and prosocial strategies regarding the mother-child relationship.

Understanding these relationships are important to understanding what affects developmental trajectories and where potential interventions can be placed to assist when needed. Particularly, the current study contributes to the understanding of these factors and literature by placing emphasis on the need to analyze contributing factors -- be it physiologically, parentally, trauma-related, etc. -- to specific characteristics of personality traits, as what was done here with desire for control and Machiavellianism, as the relationships between traits and these factors could be impacted more heavily by specific characteristics rather than the trait.

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