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From the Editor's Desk

Hello, everyone! Welcome to the second issue of the *Journal of Psychological Inquiry* with me as the managing editor. I'm beginning to think that I might actually get the hang of this gig after a few years.

With plenty of assistance from Autumn Taylor, my graduate student assistant, I continue to sift through articles that were accepted for publication by the previous managing editors, Jennifer Bonds-Raacke and John Raacke. All the students who wrote articles that appear in this issue of JPI have been waiting patiently to see the results of all their hard work published. Now the authors can officially change the citation in their CVs from "in press". Congratulations!

When I took on the role of managing editor of JPI in fall of 2018, the submission portal was inactive. That all changed in the spring, when I posted a link in www.psychinquiry.org, the website for JPI, to the submission portal. Now, anyone who wishes to submit a manuscript can do so.

To submit a manuscript for consideration at JPI, go to the Instructions for Authors page at psychinquiry.org, and click on the link for the submission portal: www.editorialmanager.com/jpi. Several authors have already submitted their manuscripts, which are currently under review.

Now that JPI is "live", get your manuscripts together and submit them!

Ken Sobel
University of Central Arkansas
Managing Editor

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Elizabeth A Dahl, PhD., Award for Excellence in Undergraduate Research

ADULTS' EMOTIONAL AND COGNITIVE REACTIONS TO SELF-REPORTED STEREOTYPING EXPERIENCES

CLAUDIA SALAZAR AND MARY SLEIGH

WINTHROP UNIVERSITY

Abstract - Adults (n = 206) described a time when they experienced a stereotyping situation that had a negative outcome and a situation that had a positive outcome. Participants, particularly African-American participants, provided fewer examples of positive outcomes. The most frequently reported positive outcomes were motivation to disprove the stereotype and a strengthened interpersonal relationship. Negative outcomes were more likely to emerge when the stereotyping occurred in a group setting, whereas positive outcomes were more likely in intimate settings. Participants did not differ in how intensely they felt, talked about, or thought about their negative and positive stereotyping situations; however, their written narratives for the negative events were coded as more emotional and they reported coping more poorly with them over time. Social dominance orientation, a belief system supporting social hierarchies, related to less intense reactions to being stereotyped, as well as a higher tendency to self-report stereotyping others. Heightened vigilance, an increased awareness of one's surroundings, related to more intense reactions to being stereotyped. Race emerged as a more influential variable in determining perceptions of stereotyping situations than did gender.

Keywords: stereotypes, vigilance, social dominance, inequality, positive stereotypes

Stereotypes can be defined as beliefs or expectations about the qualities and characteristics of groups of people constructed prior to obtaining factual information about the individual or group (Fiske, 2010; Nelson, Acker, & Manis, 1996). Stereotypes are conceptually distinct from prejudice or discrimination; stereotypes are fixed, overgeneralized ideas about certain groups, prejudice refers to the affect people have toward those groups, and discrimination represents the actions people take toward those groups (Aronson, Wilson, & Akert, 2012).

Certain societal groups are stereotyped more frequently than others. For example, women can be stereotyped as unable to perform to the standard of men in science, technology, and math domains (Ben-Zeev, Fein, & Inzlicht, 2005; Ryan, 2015). Other common stereotyped groups include Asian Americans being depicted as intelligent overachievers (Thompson, Kiang, & Witkow, 2016), gay individuals as more emotional than heterosexuals, (Haddock, Zanna, & Esses, 1993; Madon, 1997; Šević, Ivanković, & Štulhofer, 2016) and African American men as threatening, aggressive, and criminal (Brown, 2006; Moss & Tilly, 2003; Neckerman & Kirschenman, 1991; Pager & Karafin, 2009).

Engaging in categorical thinking can provide cognitive ways to organize the world and assist with perception processes (Macrae & Bodenhausen, 2000). However, stereotypes are associated with a multitude of negative consequences for the stereotyped individual (Czopp, Kay & Cheryan, 2015). Research has demonstrated that the experience of being stereotyped can lead to mind wandering, anxiety, development of incorrect perceptions, poor performance in a variety of domains, and diminished ability to focus on a task (Lambert et al., 2016; Lu et al., 2015; Sun, Zuo, Wu, & Wen, 2016).

These negative outcomes result from the fact that stereotypes usually convey the message that members of the stereotyped group are inferior in some way. Not only is having a self-perception of inferiority detrimental, but it may also lead to feeling that one is threatened. Stereotype threat (ST) is a term used to describe a stereotyped individuals' feelings that they are at risk of confirming a negative stereotype about one of their own

groups (Spencer, Logel, & Davies, 2016; Steele & Aronson, 1995). The irony is that this feeling can lead to the individual performing in a way that confirms the stereotype simply because of the anxiety created by the thought of doing so (Schmader, 2010). For example, when women were reminded of the stereotype that their mathematical abilities are weaker than men's, they exhibited worsened performance (Spencer, Steel, & Quinn, 1999). Stereotype threats have been demonstrated to impair people's abilities in athletic, social, and political situations (Bosson, Haymovitz, & Pinel, 2004; Pennington, Heim, Levy, & Larkin, 2016; Stone, Lynch, Sjomerling, & Darley, 1999).

Although experiencing stereotyping has been shown to be more prevalent among minorities and marginalized groups (Adams, Kurtz-Costes, & Hoffman, 2016; Sonnett, Johnson, & Dolan, 2015), even non-marginalized members of a society can experience stereotyping threat. For example, when high-social status individuals are primed to think about their privilege, it creates feelings of guilt; those individuals can then engage in negative self-stereotyping (Arminio, 2001; Branscombe, 1998).

In contrast to the myriad of negative outcomes associated with stereotyping, some studies have found outcomes that could be considered beneficial for the stereotyped individual. For example, a stereotype tax occurs when individuals use stereotyping to their own advantage (Vedantam, 2015). Vendantam (2015) used the illustration of a female playing at the World Series of Poker: Tournament of Champions, a male dominated competition. In this illustration, the female was stereotyped as a feeble sexual object by the male competitors. The female used this perception to her advantage by acting charming as she deceitfully bluffed when it was her turn and ultimately winning the game.

Another beneficial outcome is when a stereotyped individual uses the stereotype as a motivating force to perform at a higher level and disprove the stereotype. For example, individuals who experience stereotype threat may improve their performance in an effort to disprove the stereotype. This concept is known as the mere effort account and motivates stereotyped individuals to perform better (Jamieson & Harkins, 2007; Seitchik & Harkins, 2015).

A third way that stereotypes can result in beneficial outcomes has emerged out of research focused on positive stereotypes. Positive stereotypes assign "positive" characteristics to individuals that are stereotypical to their membership in a certain group, for example, the assumption that all Asians are high achievers (Dang & Kline, 2015; Lin, Kwan, Cheung, & Fiske, 2005) or that African-Americans are superior athletes (Czopp & Monteith, 2006; Kay, Day, & Zanna, 2013). The stereotyped attribution imparts a level of favorability or dominance, but the process is still one of judging an individual based on a perception of that individual's membership in a group (Czopp, Kay & Cheryan, 2015). Such positive stereotypes are prevalent in today's society (Saad, Meyer, Dhindsa, & Zane, 2015). One claimed benefit of positive stereotyping is stereotype boost, an effect that occurs when the use of a positive stereotype boosts, or improves, an individual's performance (Shih, Pittinsky, & Ho, 2012).

A limitation of positive stereotypes is that they often exist alongside negative stereotypes (Hall & Blanton, 2009). For example, adults might hold the beliefs that Asians are intelligent, but also cold, or that women are warm, but weak (Fiske, Cuddy, Glick, & Xu, 2002). Recent research indicates that adults who experience positive stereotyping are aware that they are being negatively stereotyped at the same time, and respond with powerful negative emotions (Siy & Cheryan, 2016; Sue et al., 2007). In addition, the targets of the positive stereotypes tend to hold unfavorable impressions of those stereotyping them (Czopp, 2008; Siy & Cheryan, 2016).

There are many factors that influence how people attend and respond to being stereotyped. For example, individuals who display vigilance can be more prone to expect stereotyping and rejection (Mendoza-Denton, Downey, Purdie, Davis, & Pietrzak, 2002). Vigilant individuals also tend to focus their attention to particularly hostile cues when feeling threatened (Pratto & John, 1991). Since stereotyping can feel threatening, victims of stereotyping typically experience heightened vigilance (Pratto et al., 2000; Tausch & Hewstone, 2010).

Social dominance is another variable that may influence how people interpret social situations. People high in social dominance orientation (SDO), compared to people low in SDO, tend to more strongly hold beliefs that legitimize the unequal distribution of social values, agree more with discriminatory policies, and disagree more with policies that promote equality (Pratto, Sidanius, & Levin, 2006). People high in SDO tend to engage in more unequal social actions and behavior, such as discrimination, since social dominance focuses on the social hierarchies of dominance and oppression (Klotz & Neubaum, 2016; Pratto, Sidanius, & Levin, 2006).

Although stereotyping is a heavily researched construct, fewer studies have focused on the extent to which adults believe that stereotyping can result in beneficial, or positive, outcomes and the specific situations that would lead to that perception. Thus, one

goal of this study was to prompt people to share personal experiences with stereotyping that resulted in negative and positive outcomes in order to compare the setting and characteristics of the situations. We also wanted to compare adults' cognitive and emotional reactions to those situations. Last, we examined whether personal characteristics, such as a social dominance orientation and heightened vigilance, would predict individuals' perceptions of stereotyping situations. We specifically hypothesized that:

1) Individuals would spend more time thinking and talking about their negative outcome situations than their positive outcome situations.

2) Individuals would have a more intense emotional reaction to their negative outcome situations than to their positive situations.

3) Experiencing an increased sense of motivation would be the most common reason that participants would perceive a stereotyping situation to have resulted in a positive outcome.

4) Individuals high in social dominance orientation would report less intense emotional reactions and would spend less time thinking about their stereotyping situations.

5) Individuals characterized by heightened vigilance would report a more intense emotional reaction to their stereotyping situations.

Method

Participants

Participants were 206 adults recruited through social media outlets, personal contact, and undergraduate classrooms at a mid-sized southeastern university. The mean age was 25.40 (*SD* = 10.63), with a range of 18 to 68. Twenty-nine participants self-identified as men and 147 as women; the remainder chose not to provide gender information. One hundred seventy-five participants identified an ethnicity and the remaining 31 chose not to provide information. Of those who provided information, 52.9% were White/Caucasian, 17% were Black/African American, 5.8% were Hispanic/Latino, 4.9% were Multiracial, and 4.4% indicated they were another race or ethnicity not listed. Eighty-six percent of participants self-identified their sexual orientation. Of those who responded, 69.6% reported being straight, 5.6% being gay, 6.8% being bisexual, 1.5% being asexual, 1.5% being pansexual, and .5% chose the "other" option. Out of the 206 participants, 193 answered their place of origin as the United States, and the remainder identified their place of origin as another country; all participants responded to this demographic question.

The study was approved by the University's Institutional Review Board. Participation was voluntary. Students in some courses were offered extra credit for participating in this study, otherwise no compensation was offered for participation.

Materials

The Everyday Discrimination Scale (EDS; Williams, Yu, Jackson, & Anderson, 1997) was used to evaluate the frequency of individuals' perceived discrimination towards them. The nine items in this scale correspond to generalized treatment, without mention of any specific category such as race, gender, or sexual orientation. For example, questions on this scale include "You are treated with less courtesy than other people are" and "People act as if they think you are not smart." Responses were made on a 5-point Likert-type scale where "1" represented "never" and "5" represented "almost every day." We calculated a mean score for each participant, with a higher score indicating more discrimination. The published reliability for the scale is α = .88 (Williams, Yu, Jackson, & Anderson, 1997) with established construct validity (Stucky et al., 2011), and stability (Lewis, et al., 2006). We obtained a Chronbach's alpha of .83.

The Social Dominance Orientation Scale (SDO; Pratto, Sidanius, Stallworth, & Malle, 1994) consisted of 16-items that measured the extent to which individuals perceive themselves as being superior or inferior to others, whether they favored group-based hierarchy, and the extent to which individuals valued equality- all of which generalize across a wide array of domains (i.e. different genders, religions, orientations, ethnicities, etc.). The SDO scale consists of items such as "Sometimes other groups should stay in their place," and "We should do what we can to equalize conditions for different groups." Responses were made on a 7-point Likert-type scale with 1 representing "very negative" and 7 representing "very positive." Responses were averaged with a higher score indicating more social dominance. The published reliability for the scale is α = .91 (Pratto, Sidanius, Stallworth, & Malle, 1994) with validity further established by Ho, et al. (2012). We obtained a Chronbach's alpha of .90.

The Heightened Vigilance Scale (HVS; Chicago Community Adult Health Study, 2001 & Detroit Area Study, 1995) was used to assess participants' level of focus on their environment and potential danger. HVS consists of six items all starting with the instructions, "In your day-to-day life, how often do you do the following things." Subsequent to that, participants responded to items such as, "Try to avoid certain social situations and places," and "Think in advance about the kinds of problems you are likely to experience?" Responses were made on a Likert-type scale where 1 represented "very often" and 5 represented "never." The responses were

summed and a higher score indicated heightened vigilance. The published reliability is α = .72 (Williams, 2012) with validity further established by Himmelstein, Young, Sanchez, and Jackson (2014). We obtained a Chronbach's alpha for the HVS of .83.

In addition to responding to published scales, the survey instructed participants to "Think about a time when someone treated you in a stereotyped manner and you felt badly as a result. Briefly describe the situation." Participants were provided with an open field, with no length limitations, in which to respond. Immediately following, participants were prompted to "Continue to think about this experience as you answer the following questions." Nine questions created by the researchers assessed participants' reactions to the described situation. For example, participants were provided with a list of ten emotional reactions (e.g., embarrassed, depressed, relieved, surprised, offended, and shocked) and were asked to rank the top three that they experienced most strongly in relation to the stereotyping situation. Participants were also asked to indicate how intensely they felt the emotions, how many people they spoke to about the situation, how much time they spent thinking about it, how well they felt that they had coped with it, and how long ago the situation occurred. Responses were made on Likert-type scales. These questions were loosely based on the work of Krieger (1990) and McNeilly et al (1996) two studies which assessed adults' strategies for coping with discrimination. We did not utilize their specific scales, because our focus was on responses to being stereotyped, not discriminated against. We also wanted to be careful that the questions did not prime participants to think of the stereotyping situation either positively or negatively. The previously published scales assumed that the experience was negative.

Next, the survey instructed participants to "Briefly describe a time when someone treated you in a stereotyped manner and you were able to find something positive in the situation. For example, you may have learned something, strengthened your ability to handle such situations, reassessed a friendship, or motivated you to prove someone wrong. Briefly describe the situation in the space provided." Identical to the solicitation of a negative outcome situation, participants were provided with an open field in which to respond and then given the same nine questions to assess their reactions to the stereotyping experience.

Two raters independently coded the data from the two stereotyped experiences provided by each participant. Each scenario was coded for the following factors: whether the situation was personally experienced or observed, whether the participants focused on how the situation made them feel about themselves, how many people were involved, where it happened, how much control the participant had over the reason for being stereotyped, and the level of emotion expressed. Rates also coded whether the stereotyping was direct, something said or done directly to the participant, or assumed, where the participant believed that others had thoughts or opinions that were not directly expressed. The inter-rater reliabilities ranged from .73 to 1.0, with the majority being 1.0. The raters were blind as to whether they were rating positive or negative outcome scenarios; the reliabilities were calculated for variables across the two scenarios.

The researchers created five questions to assess participants' perceptions of prevalence of stereotyping (e.g., Everyone uses stereotypes in their thinking to some extent) and their own personal experiences with stereotyping and discrimination (e.g., Overall, how much has discrimination interfered with you having a full and productive life?). Last, demographic questions requested participants' age, gender, and sexual orientation.

Procedure

Participants were recruited through personal contact, social media outlets, and undergraduate classrooms, creating a convenience sample. Participants were directed to an online survey administered through Qualtrics. Participants first responded to the SDO scale. We placed this scale first because the questions refer to social hierarchies. We wanted participants to provide honest answers, perhaps revealing their own agreement with societal stereotyping, which may have been compromised if they had realized that the study was going to focus on stereotyping situations. Then participants were asked to briefly describe a negative outcome situation and provide information about their perceptions. Next, they were asked to briefly describe a positive outcome situation and provide information about their perceptions. The request for the negative situation was intentionally placed first, because we believed that our participants would more easily understand the link between being stereotyped and experiencing a negative, versus a positive, outcome. We wanted them to have this easier-to-understand experience before asking them about the possibility of a stereotyping situation that resulted in a positive outcome. Participants then responded to the HVS, the EDS, the researcher-created questions, and demographic questions. The HVS and EDS were intentionally placed

near the end of the survey. Our study asked participants to describe a stereotyping situation that resulted in a positive outcome. We were not sure that participants would even be able to complete this task, because it violates the common, negative way that people perceive stereotyping. The questions of the HVS and EDS assume that stereotyping and discrimination are negative events, and thus, the wording of these scales had the potential to prime our participants against being able to provide a positive outcome situation.

Results

Ninety-one percent of participants responded to our request for a stereotyping situation that had a negative consequence, while only 64.4% of participants responded to our request for a stereotyping situation that had a positive consequence. Two point nine percent of participants in the negative and 9.8% of participants in the positive situations wrote "not applicable" or "n/a" instead of providing a narrative. Seventeen participants described the same situation for both our positive and negative request; however, they focused on slightly different aspects and outcomes each time. We then focused specifically on African American and Caucasian participants as these were our most heavily represented race categories. Ninety-one percent of participants in both categories provided a negative outcome situation. Eighty-two percent of Caucasians, and 57% of African Americans provided a positive outcome situation.

When we asked people to tell us about a negative outcome situation, the most frequent reason people reported for being stereotyped was being African-American followed by being a woman considered as unintelligent, and being a member of a privileged group (e.g., wealthy or Caucasian). When we asked people to tell us about a stereotyping situation that resulted in a positive outcome, the most frequent reason people reported for being stereotyped was being a woman considered as unintelligent, followed by being a woman considered as fragile, and regarding the participants' place of origin. See Table 1.

We categorized the positive outcomes that participants provided in their positive outcome situations. The most common positive outcome was that participants successfully used the experience as motivation to disprove the stereotype (n = 40). Twenty-one participants educated or communicated with another person in a way that strengthened the relationship. Seventeen participants relied on their inner strength to

Table 1.

Number of People in Stereotyped Groups in the Positive and Negative Scenarios

Stereotype Groups	Negative	Positive
African American	26	11
Women perceived as unintelligent	22	11
Privilege group	14	3
Weight	13	7
Appearance	11	7
Place of origin	11	10
Non-heterosexual	10	8
Women perceived as fragile	9	15
Accent	7	2
Hair color	7	2
Man	5	0
Athlete	5	2
Low income	4	5
Religion	4	4
Skin tone	4	4
Age	3	3
High income	3	2
Style in fashion	3	2
Education	2	3
Mental health	2	3

ignore the other person's opinion. Twelve participants perceived some type of social or educational benefit. Ten participants grew or developed skills, and the same number of participants had increased self-awareness. Eight participants reduced their own stereotyping and experienced increased sensitivity to others. Last, three participants reassessed and aborted a relationship with the person who stereotyped them.

When participants described their negative outcome situation, qualitative analysis of the narratives revealed that the stereotyping most often occurred in a social/group setting (68.9% of the time). When participants described their positive outcome situation, it was most frequently described as occurring one-on-one (55.1% of the time). In both the positive and negative situations, participants experienced a direct comment or action in 73% of the narratives and assumed that they were being stereotyped in the remainder. In the negative situation, participants focused their narrative on how the situation made them personally feel (versus focusing on the feelings of others in the situation) 81.8% of the time, and in the positive situation focused on their personal feelings 83.8% of the time.

We compared participants' perceptions of the positive versus negative outcome situations using a dependent *t*-test; the means can be found in Table 2. Participants did not differ in how much time they spent thinking about the two situations and how many people to whom they spoke about the situations. Participants reported experiencing similar levels of emotional intensity regarding the positive and emotional stereotyping situations; however, based on the qualitative analysis of the written narratives, participants expressed more emotion when writing about the negative situation, $t(109) = 4.62$, $p < .001$. Participants also indicated that they had dealt more poorly with the negative, versus positive outcome situation, $t(153) = -3.59$, $p < .001$.

Participants reported having more positive feelings toward the people who were involved in the positive outcome situation than toward the people who were involved in the negative outcome situation, $t(153) = -6.49$, $p < .001$. In contrast, participants reported feeling better about themselves after the negative situation than after the positive situation, $t(152) = 9.22$, $p < .01$.

Table 2.

Mean Response to Dependent Variables in Positive and Negative Outcome Situations

Perception or Reaction	Negative	Positive
Emotion in Narrative	2.37 (1.09)*	1.83 (.75)
Self-reported Emotional Intensity	2.38 (.96)	2.23 (.90)
Dealt with Situation	3.0 (.91)*	3.26 (.83)
Time Spent Thinking About	1.91 (.61)	2.0 (.73)
Amount of People Shared Info With	2.18 (.87)	2.26 (.95)
Perception of People Involved	1.91 (.89)*	2.58 (1.17)
Perception of Self	3.54 (.88)*	2.5 (1.15)

* $p < .001$

We asked participants to select and rank the top three emotional responses they had after their self-reported stereotyping situations. Results are depicted in Table 3. Participants most frequently reported feeling offended in the negative outcome situation followed by angry, shocked, surprised, and embarrassed. Participants reported most frequently feeling surprised in the positive outcome situation followed by offended, relieved, angry, and shocked. A dependent *t*-test on the rankings revealed

Table 3.

Number of Participants Selecting and Mean (and Standard Deviation) of Emotional Reactions to Positive and Negative Outcome Situations

Emotion	Number Selecting	Negative	Number Selecting	Positive
Offended	131	1.76 (.75)	64	1.81 (.79)
Angry	117	1.95 (.84)	54	1.93 (.89)
Shocked	64	1.97 (.84)	61	2.11 (.80)
Surprised	60	2.07 (.90)	88	1.58 (.78)*
Embarrassed	67	2.07 (.84)	50	2.2 (.81)
Disappointed	74	2.08 (.84)	52	2.19 (.77)
Isolated	54	2.20 (.86)	36	2.36 (.76)
Ashamed	61	2.26 (.77)	35	2.29 (.83)
Relieved	19	2.26 (.93)	60	1.92 (.83)
Depressed	42	2.29 (.86)	24	2.25 (.79)

* $p < .001$

that participants felt more surprise in the positive situation than in the negative situation, $t(34) = 2.21$, $p = .034$; there were no other significant differences in the type of emotions experienced in the two situations. Participants' SDO, EDS, and vigilance scores did not predict the type of emotions they experienced in the negative outcome situation; however, in the positive outcome situation, participants high in EDS were less likely to experience shock as evidenced by their rankings of this emotion, $r(61) = .32$, $p = .013$, a moderate relationship. Similarly, participants high in SDO were less likely to experience embarrassment, $r(50) = .28$, $p = .049$, and participants high in vigilance were less likely to feel relieved, $r(60) = .28$, $p = .032$; both relationships had small effect sizes.

We examined additional relations among variables using Pearson's correlations and found several small effects. The higher the participants scored on SDO the less emotionally intense they rated their negative, $r(198) = -.21$, $p = .004$, and positive, $r(155) = -.18$, $p = .022$, stereotyping situations to be. The higher the SDO score, the more positively they felt toward the people who were involved in the negative, $r(199) = .18$, $p = .01$, and positive, $r(155) = .17$, $p = .035$, stereotyping situations. Similarly, the higher the SDO score, the less time participants spent thinking about their negative situation, $r(197) = -.17$, $p = .016$. The higher the SDO score the less participants agreed that discrimination has interfered with them having a full and productive life, $r(176) = -.17$, $p = .021$, and the more frequently participants said that they tend to stereotype other people, $r(176) = .22$, $p = .003$.

The higher the EDS was, the more emotionally intense participants rated their negative outcome situation, $r(173) = .21$, $p = .006$. The higher the EDS, the more time participants spent thinking about the negative, $r(173) = .29$, $p < .001$. We found a moderate relationship between a higher EDS score and time spent thinking about the positive stereotyping situations, $r(154) = .30$, $p < .001$. The higher the EDS, the more participants agreed that discrimination has interfered with them having a full and productive life, resulting in a moderate relationship, $r(176) = -.38$, $p < .001$, and the more participants reported seeing themselves as victims, resulting in a small effect, $r(176) = .16$, $p = .035$. EDS was positively correlated with participants' vigilance scores, resulting in a strong relationship, $r(175) = .51$, $p < .001$.

For the negative outcome situation, higher vigilance was positively correlated with more intense emotional reactions, $r(172) = .24$, $p = .002$, more time spent thinking about it, $r(172) = .24$, $p = .001$, and more people with whom the situation was discussed, $r(154) = .17$, $p = .035$. For the positive outcome situation, the higher vigilance score, the worse the situation affected how participants felt about themselves, $r(154) = -.16$, $p = .042$, and the more time they spent thinking about the positive stereotype situation, $r(154) = .26$, $p = .001$. These represent small effects.

The higher the vigilance scores, the more participants agreed that discrimination has interfered with them having a full and productive life, resulting in a moderate relationship, $r(175) = -.48$, $p < .001$. Higher vigilance showed a small effect with the more participants reported seeing themselves as victims, $r(175) = .22$, $p = .003$. Vigilance was also positively correlated with greater agreement that everyone uses stereotypes in their thinking to some extent, $r(174) = .20$, $p = .007$, and more frequent personal experiences of being stereotyped, $r(175) = .15$, $p < .001$; both of these represented small effects.

We compared Caucasian and African American participants using an independent *t*-test. Compared to Caucasians, African Americans had higher vigilance scores, $t(142) = -2.9$, $p = .004$, and spent less time thinking about the negative outcome situation they described, $t(141) = 2.9$, $p = .004$. There were no race differences related to the positive outcome situation.

We also compared men and women using an independent *t*-test. Compared to men, women felt more negatively toward the people involved in their positive situation, $t(152) = -2.70$, $p = .008$. There were no other gender differences.

Discussion

One goal of our study was to examine to what extents adults perceive that a stereotyping situation can result in a positive outcome. We found that the majority of our participants provided a narrative of a stereotyping situation that resulted in a negative outcome; however, only 64% of our participants provided a narrative that resulted in a positive outcome. Around 10% of those who did not provide a narrative indicated that the request was not applicable instead of simply leaving the form blank, perhaps suggesting that they did not believe such a situation could exist.

Another possible reason for the smaller number of positive outcome situations is that participants were less motivated to provide a second narrative after having already provided the first; however, in opposition to this argument, participants who did not provide a second narrative continued to answer subsequent questions in the survey offering some evidence of continued motivation. Yet another possibility is that adults may have experienced multiple outcomes in response to stereotyping but found it easier to recall situations that

ended badly. Offering some opposition to this explanation, in general, adults tend to remember positive life events more readily than they remember negative ones (Storm & Jobe, 2012). In addition, Li (2012) recently demonstrated that adults tend to forget unkind acts more readily than kind acts.

Another reason that we may have received more narratives of negative outcomes is that the positive outcomes usually required cognitive or emotional effort on the part of the participants, perhaps making them less common. For example, the most frequently reported reason that participants perceived a stereotyping situation as having a positive outcome was that it motivated them to disprove the stereotype or to strengthen their relationship with the person who stereotyped them. This finding matched our second hypothesis, as well as previous research which focused on the motivating effects of disproving a stereotype (Jamieson & Harkins, 2007; Seitchik & Harkins, 2015). Seventeen participants described the same situation for both the positive and negative outcome question. It may be important to note that all of the participants who provided positive outcomes had previously provided a negative one; thus, the ability to create a positive outcome does not seem to be a universal strategy that is employed in, or applicable to, every stereotyping situation.

A second goal of our study was to explore the setting and characteristics of the two stereotyping situations. We found both similarities and differences. When we categorized why participants felt they were stereotyped, feeling that the reason was for being a woman was common in both positive and negative outcome situations. However, experiencing stereotyping for being African-American or privileged (a term used by the coders for groups who experience societal benefits, such as men and wealthy individuals) was more common for the negative, versus positive, situations. These findings indicate that it may be more difficult to overcome, or disprove, the negative stereotypes associated with race and privilege; perhaps these stereotypes are more deeply embedded in society. Stereotyping of African Americans has a long history and come from both outside and inside of the African American community (e.g., Adams, Kurtz-Costes, & Hoffman, 2016; Sonnett, Johnson, & Dolan, 2015). Previous researchers have also found that when members of a privilege group are primed to think about their privilege it leads to strong feelings of guilt (McGowan & Kern, 2016; Arminio, 2001; Branscombe, 1998).

Another differentiating feature was that negative outcome experiences most frequently occurred in a group setting, whereas the positive outcome experiences were more likely to occur one-on-one. Stereotyping that occurs in a public setting involves multiple people and less privacy, perhaps making it more challenging to create a positive outcome. For example, it is easier to disprove a stereotype to, or strengthen a relationship with, one person than a group of people. In fact, our data revealed that adults in the positive situations felt more positively toward the people involved than they did in the negative situations.

In contrast, adults reported feeling more positively toward themselves following the negative versus the positive outcome situations. This attitude may reflect a form of self-defense, in which the stereotyped individual affirms to him or herself that the unpleasant stereotype is invalid. A related idea is that being stereotyped leads to increased identification with the stereotyped group of which the individual is a member, and this identification can be self-protective (Newman, Keough, & Lee, 2009). In fact, in the face of negative stereotypes, individuals often will cognitively embrace the positive stereotypes that co-exist with being a member of that group (Biernat, Vescio & Green, 1996; Glick et al, 2000).

Alongside differences between the positive and negative narratives, we also found commonalities. In both situations, most participants described experiencing a direct action or comment, and most of the narratives focused almost exclusively on the emotions of the narrator. These are not surprising given that participants were asked to report on a personal and emotional situation. The direct versus indirect finding may also offer some insight into the greater number of negative outcomes reported; even when the stereotyping offers a positive group attribution, hearing it directly, versus subtly, is more likely to result in negative consequences for the target (Shih et al., 2002; Siy & Cherynan, 2013).

We hypothesized that adults would spend more time thinking and talking about their negative than about their positive outcome situations. This hypothesis was not supported; participants reported spending equal amounts of time pondering and discussing the situations. Even when the outcomes differed, the mere experience of being stereotyped seemed to result in similar reflective behaviors.

We also hypothesized that individuals would have had a more intense emotional reaction to the negative, versus positive, outcome situation. Contradicting this hypothesis, participants reported equally intense emotional reactions to the two situations, providing further explanation for why they may have thought and talked about the experience at similar rates.

However, our coding suggested that participants wrote about the negative situations with greater affect. These findings suggest that participants may have felt similarly in the immediate aftermath of the situation but did not later recall the situation with similar levels of affect. In fact, our participants reported having done a better job of dealing with the positive situation, which lends support to the argument that writing about the negative situation conjured unresolved feelings. Given the nature of the described outcomes, such as improved relations and personal growth, it is not surprising that positive outcomes led to some level of emotional resolution.

Although the emotional intensity was equal during the situations, the patterns of emotions experienced were unique. Participants experienced more surprise in the midst of the positive than the negative outcome situations. This emotion might have resulted from the more intimate nature of these interactions, as the positive situations were more likely to happen in a one-on-one setting. People may have felt a greater sense of safety and comfort in these situations, and thus, were surprised by the stereotyping. The surprise, in the context of the one-on-one interaction, may have then served as the motivating force to create a positive outcome from the situation.

In both scenarios, participants frequently felt offended, angry, and shocked. These feelings make sense given that most stereotypes are about a group's inferiority (Plous & Williams, 1995). What might be interesting to note is that these emotions did not dictate whether the outcome was positive or negative. Taken collectively, our results provide evidence that the outcome of a stereotyping situation cannot be solely predicted by emotional intensity, emotional experience, nature of the stereotyping, or reason for being stereotyped.

Individuals high in SDO are comfortable with social inequalities (Pratto, Sidanius, & Levin, 2006). Supporting this definition, we found that participants high in SDO were more likely to disagree that discrimination has impacted their lives and to agree that they tend to stereotype other people. We hypothesized that high SDO people would report less intense emotional reactions and would spend less time thinking about their stereotyping situations. This hypothesis was supported. Those high in SDO reported lower levels of emotional intensity, were less likely to feel embarrassed, and felt more positively toward the people involved in both of their stereotyping situations. They also spent less time thinking about their negative outcome situations, perhaps because of the less intense emotions. Carter, Hall, Carney and Rosip (2006) found that holding a SDO related to more acceptance of stereotyping. The individuals in our study seem to be aware of their own stereotyping behavior, and finding it acceptable in themselves, they also seem to be more accepting of it from others. People high in SDO may also represent more privileged social groups, making them more supportive of social hierarchies and less fearful of the negative consequences of being stereotyped.

We hypothesized that individuals characterized by heightened vigilance would report a more intense emotional reaction to their stereotyping situations. This hypothesis was partially supported. Participants high in vigilance reported more intense emotional reactions to their negative, but not their positive, outcome situation. Despite the difference in their emotional reactions, the higher the vigilance, the more time participants had spent thinking about both of their stereotyping situations. These results make sense because vigilance is characterized by a heightened awareness of social situations, especially those that are problematic; stereotyping is a problematic social situation that would likely draw the attention of vigilant adults (Schmader, Johns, & Forbes, 2008), especially the situation that resulted in a negative outcome. The heightened attention could result in more emotional intensity as well as rumination on the event. Our data also revealed that participants high in vigilance perceived more stereotyping in the world around them and felt that it had negatively affected them. Thus, it is likely that these individuals were thinking about stereotyping and discrimination in general, not just limiting their thoughts to the specific narratives they reported in our study.

Participants high in vigilance violated another pattern that we saw among the overall sample. They reported feeling worse about themselves after the positive outcome situation. This finding might warrant further research as an explanation is not immediately clear. One possibility is that participants high in vigilance expect to experience discrimination and poor social interactions. Encountering a stereotyping situation that was not entirely negative may have been more confusing for these adults, resulting in self-doubt or confusion. Providing some support for this argument, vigilant participants were least likely to feel relief after their positive situations.

Vigilance was linked to experiencing discrimination in everyday life. Participants higher in EDS demonstrated a similar pattern as those high in vigilance; they reported more emotional intensity in response to their negative outcome situation, felt less shock in their positive outcome situation, and spent more time thinking about both stereotyping situations. They also believed that discrimination and stereotyping had

negatively impacted their lives, and were in agreement that everyone uses stereotyping in their thinking to some extent. The tight connection between EDS and vigilance raises the question of whether negative social experiences force people to be constantly prepared for discrimination, heightened vigilance, or whether a heightened sensitivity leads people to perceive more situations as discriminatory. Himmelstein, Young, Sanchez, and Jackson (2014) recently found that vigilance may reduce the stressful impact of discrimination for Black Americans, lending support to the argument that discrimination experiences encourage individuals to be vigilant. Either way, those who have experienced discrimination and stereotyping seem to be more emotionally susceptible to negative outcome situations.

Because stereotyping is prevalent for the African American community (Bobo & Fox, 2003), we compared the experiences of our Caucasian and African American participants. African Americans violated the pattern previously discussed. African American adults had higher levels of vigilance, but spent less time reflecting on their negative outcome situation. Perhaps ongoing experiences with stereotyping led to diminished focus on any one experience and increased focus on possible future stereotyping; the fulfillment of an expected situation does not warrant excessive attention. In contrast, Caucasians, a group less frequently stereotyped, might see the stereotyping as an unusual and noteworthy event, leading to continued rumination. Another possibility is that due to the increased incidence of stereotyping, African Americans may have been simultaneously aware of, but also more prepared to deal with negative outcomes. Caucasians and African American participants spent equal amounts of time pondering only the positive outcome situation. This similarity suggests that stereotyping that resulted in something "good," a less common situation, captured the attention of both groups.

Our Caucasian participants were more likely to provide an example of a positive outcome situation than were African Americans. In light of the fact that it was common for people stereotyped for being African American to experience a negative outcome, one possibility is that it is less common for African Americans to experience positive outcomes. In order to label a situation as having a positive outcome, individuals typically disproved a stereotype or educated another person. These goals may be more difficult to accomplish if the stereotyping is race-based, powerful, and pervasive such as those associated with African Americans (Adams, Kurtz-Costes, & Hoffman, 2016; Brown, 2006; Pager & Karafin, 2009; Sonnett, Johnson, & Dolan, 2015). Another possibility is that African Americans may have been more reluctant to provide positive outcome situations because of the message that it might send. Claiming that a bad situation can result in a positive outcome may almost feel like legitimizing the bad situation, and African Americans may be particularly hesitant to do anything that would minimize others' recognition of the negative impact of stereotyping in today's society. Even positive stereotyping has been shown to legitimize, and thus promote, group inequalities (Czopp, Kay & Cheryan, 2015; Laurin, Gaucher, & Kay, 2013)

Finally, our study found only one gender difference. Women reported feeling more negatively toward the people involved in their positive outcome situation than men. This feeling may have emerged because many of the positive situations included women being directly stereotyped for their gender in a one-on-one setting. In contrast, men in the positive outcome narratives were never stereotyped for their gender. Because of their membership in a lower-status group, women's identification with their gender is stronger than men's identification, leading to enhanced self-stereotyping and sensitivity toward being stereotyped (Cadinu & Galdi, 2012; Casper & Rothermund, 2012). Men may have found that the positive outcome compensated for hurt feelings in the situations, whereas this conclusion may have been more difficult for women to reach. Overall, gender did not emerge as an influential variable.

This study had limitations. For example, our sample was a convenience sample, comprised of primarily female Caucasians. This sample does not reflect the population as a whole. Also, because most of the participants were from and raised in the United States, it is hard to generalize the results to an international population. Further, although we had rationale for our survey construction, the order of the scales may have affected participants' responses. Participants may have responded to the EDS and HVS more strongly, reporting more discrimination and vigilance, because we had just asked them to describe situations in which they had experienced stereotyping. Last, although many of our hypotheses were supported, the supporting statistics showed small effects. Thus, the differences between stereotyping situations that result in positive, versus negative, outcomes are not extreme.

This study also provides fruitful ground for further investigation. Participants' reactions to stereotyping situations might be further understood by examining them in the context of personal characteristics such as resilience and optimism. In addition, the unique pattern of responsiveness across racial groups might be

worthy of further consideration. Last, researchers may want to investigate why participants reported fewer positive outcome situations.

In sum, our study provided evidence that adults do perceive stereotyping situations as having the potential to result in positive outcomes; however, negative outcomes appear to be more common or at least easier to recall. Adults seem to consider situations to be positive when they resulted in behavior change, improved interpersonal relationships, or some type of growth. The social setting of the situation seems to have a powerful impact on the specific outcome. Race, social dominance, and heightened vigilance altered how individuals' emotionally responded to and thought about the situations; however, the outcome of the situation had little impact on these perceptions. Gender was even less influential on individuals' reactions to stereotyping situations. These findings add to our growing understanding of stereotyping and highlight the myriad of variables that contribute to perceptions and outcomes.

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FACIAL RECOGNITION OF DARK TRIAD TRAITS AND LINKS TO PRENATAL ANDROGEN EXPOSURE

ARIANNE FISHER AND TAYLOR WILLITS

FORT HAYS STATE UNIVERSITY

Abstract - The Dark Triad is a personality construct composed of psychopathy, Machiavellianism, and narcissism, and is commonly associated with a variety of undesirable behaviors. High prenatal androgen exposure has been associated with various behavioral and personality characteristics also commonly found in individuals high in the Dark Triad. This may suggest a link between prenatal androgen exposure and the development of the Dark Triad. Additionally, previous research has found that faces of individuals high in the Dark Triad are able to be identified at rates significantly better than chance. This identification may indicate evolutionary benefits associated with facial recognition of Dark Triad traits, particularly within the realm of mating. A total of 66 students were shown a slideshow with composite faces of individuals high and low in psychopathy, Machiavellianism, narcissism, intrasexual competition, and short- and long-term mating. Participants were asked to mark which face was most expressive of each trait on a 6-point scale. They completed the Dirty Dozen measure of the Dark Triad, and their 2D:4D ratios were also measured. Our hypothesis that individuals high in the Dark Triad would be better at identifying high Dark Triad faces was not supported. However, in accordance with evolutionary advantages, females high in the Dark Triad were worse at identifying males high in long-term mating, and narcissistic males were better at identifying females high in short-term mating and worse at identifying females high in long-term mating. Females high in narcissism were also significantly worse at picking out males high in long-term mating. No relationship between low 2D:4D ratio (indicating higher prenatal androgen exposure) and the Dark Triad was found.

Keywords: Dark Triad, facial recognition, prenatal androgen exposure, mating

Socially undesirable personality traits and behaviors have been researched extensively. It is important to understand what causes people to behave in ways that are considered unacceptable to learn how to minimize these actions and the resulting effects on others and society as a whole. One area within this large field of research focuses on a trio of personality traits that often overlap, co-occur, and correlate with a variety of undesirable behaviors. These traits are known as the Dark Triad.

The Dark Triad

The Dark Triad has three components: psychopathy, Machiavellianism, and narcissism. Each of these traits is characterized by certain aspects of personality and behavior that are typically thought of as the "dark side" of personality. Each component of the Dark Triad has its own distinct characteristics, which are outlined in the following paragraphs.

First, psychopathy is commonly defined in terms of several traits. According to Hare and Neumann (2009), psychopaths are grandiose, dominant, manipulative, unable to form strong emotional bonds with others, and lacking in empathy, guilt, or remorse. They live a lifestyle characterized by "irresponsible and impulsive behavior, and a tendency to ignore or violate social conventions and mores" (p. 792). These characteristics and behaviors are commonly measured by the PCL-R (Hare, 2003).

Christie and Geis (1970) defined Machiavellianism in terms of several traits as well. Individuals high in Machiavellianism have "a general lack of affect in interpersonal relationships, a lack of concern with conventional morality, a lack of gross

psychopathology, and low ideological commitment" (p. 3-4). Individuals high in Machiavellianism are manipulators with a cynical view of the world who exploit others for their own gains. In opposition to psychopathy, individuals high in Machiavellianism are strategic in their exploitation and tend to plan rather than act impulsively (Jones & Figueredo, 2013).

Finally, narcissism is characterized by a sense of entitlement and a grandiose and inflated sense of self (Raskin & Hall, 1979). Narcissists lack empathy and are willing to hurt others if it means preserving their own sense of self and image. Similar to psychopathy and Machiavellianism, narcissism also involves manipulation; narcissists inflate and exaggerate their positive characteristics to manipulate those around them in order to receive praise and ego validation (Jones & Figueredo, 2013).

Given the antisocial nature of these personality traits, it is not surprising the Dark Triad has been associated with many undesirable and seemingly disadvantageous behaviors. One of these self-serving domains is the propensity for Dark Triad individuals to engage in competitive and power-seeking behaviors, often with disregard for the path they take to gain success. Dark Triad traits are predicted by a tendency to strive for dominance and ruthless self-advancement, which can involve an arsenal of tactics, including intimidation, manipulation, and aggression (Semenyna & Honey, 2015). Jones and Neria (2015) also found the common core the Dark Triad, callousness and manipulation, to be predictive of general aggression.

In relation to aggression, the Dark Triad is positively associated with bullying and vengeance and negatively associated with justice and forgiveness (Baughman, Dearing, Giammarco, & Vernon, 2012; Giammarco & Vernon, 2014). The interaction of these traits with dominance-oriented goals combined with other Dark Triad characteristics such as impulsivity and risk-taking may work to create a dangerous, but effective, way for these individuals to compete for power and status. These high Dark Triad individuals may also create an exploitative social strategy in order to take advantage of their environment. This includes using both an agentic (i.e. individualistic and competitive) and prosocial (i.e. altruistic and agreeable) strategy to exploit individuals and gain a competitive advantage depending on the situational demands (Jonason, Li, & Tiecher, 2010).

Individuals in environments with other conspecifics high in the Dark Triad can feasibly be at risk for manipulation. Also, since individuals high in the Dark Triad tend to up-regulate their competitiveness, they may be looking for any competitive advantage. Individuals high in the Dark Triad could benefit from being able to recognize their most prominent competitors—other individuals high in the Dark Triad. Based on the competitive and exploitative strategies of Dark Triad individuals, it may be both protective and advantageous for others with high levels of the Dark Triad to recognize these individuals.

It may be beneficial to recognize Dark Triad individuals not only because of their social dominance orientation, but also for the myriad of other negative behaviors that have been associated with individuals high in the Dark Triad. Higher levels of the Dark Triad have been associated with greater sensation seeking, a greater likelihood of engaging in antisocial behaviors, and increased satisfaction at the misfortune of others (James, Kavanagh, Jonason, Chonody, & Scrutton, 2014). The Dark Triad is even positively correlated with a tendency to engage in the seven deadly sins (i.e. anger, envy, gluttony, greed, lust, pride, and sloth) (Veselka, Giammarco & Vernon, 2014). Additionally, the Dark Triad has been linked to an increased willingness to lie and deceive others; more specifically, high levels of psychopathy are associated with lying for no reason, and both psychopathy and Machiavellianism are related to more frequent lies (Jonason, Lyons, Baughman, & Vernon, 2014). Individuals high in the Dark Triad have also been found to use their emotional intelligence for malicious purposes, namely to manipulate others for their own benefit (Nagler, Reiter, Furtner, & Ruthmann, 2014). Because of the deceptive and antisocial nature of individuals high in the Dark Triad, it may be beneficial to be able to recognize and be cautious of these individuals, especially for others who employ similar tactics.

The mating styles associated with the Dark Triad are also counter to societal norms. The Dark Triad construct has been consistently associated with a short-term mating strategy, a larger number of sexual partners, and higher scores on sexual openness (Jonason et al., 2009). One explanation for this short-term mating strategy may stem from life history theory. Life history theory examines the various tradeoffs individuals must make due to the conflict and unpredictability of their environment. The Dark Triad has been associated with a fast life strategy, which is accompanied by an increase in offspring and a decrease in parental investment compared to individuals in a slow life history (Jonason, Koenig, Tost, 2010). Short-term relationships, such as one-night stands and friends-with-benefits styles, are positively correlated with the Dark Triad, whereas long-term, serious, romantic relationship styles are negatively correlated (Jonason, Luevano, & Adams, 2012). Although individuals high in the Dark Triad prefer short-term

mating strategies in general, assortative mating theory explains these individuals may give preference to mates who exhibit some of the same physical and personality characteristics as themselves (Asquith, Lyons, Watson, & Jonason, 2014; Buss & Barnes, 1986). Individuals high in the Dark Triad may benefit from recognizing others with similar lifestyles (i.e. excitement, volatility) so they can create an environment rich in short-term mating opportunities (Jonason, Lyons, & Blanchard, 2015).

Intrasexual competition is another domain that has been associated with the Dark Triad. Intrasexual competition involves competing with members of the same sex in order to obtain mating access to members of the opposite sex, and may include tactics such as resource displays, enhancing physical appearance, and boasting (Buss, 1988). Mate poaching is one strategy that Dark Triad males employ to gain access to members of the opposite sex. This tactic involves stealing a female from a member of the same-sex and may work to provide increased opportunities for short-term mating partners. Additionally, because Dark Triad individuals are more willing to poach mates, these individuals must also utilize mate retention tactics to protect themselves from losing their own mates. Some of these tactics include aggressive behavior, displays of resources, and appearance enhancements (Jonason et al., 2010). Although mate poaching may be linked to reproductive success because of increased access to mating opportunities, the increase in intrasexual competition causes these individuals to be wary of others employing the same tactics. This similarity in core characteristics may arise because of common developmental pathways for the Dark Triad traits. The developmental pathways of these traits are not well understood at this time, but one possible explanation may be prenatal androgen exposure.

Prenatal Androgen Exposure

Prenatal androgen exposure is a measure of the amount of male hormones (androgens) an individual is exposed to in the womb. The ratio of the second to fourth finger (2D:4D ratio) has been shown to be a reliable measure of prenatal androgen exposure (Lutchmaya, Baron-Cohen, Raggatt, Knickmeyer, & Manning, 2004). The levels of androgens one is exposed to prenatally may have an effect on behavioral and personality characteristics after birth; high and low levels of prenatal androgen exposure have been linked with various personality traits and behaviors in past studies. For example, low 2D:4D ratios (indicating higher prenatal androgen exposure) have been linked to intrasexual threats, various types of aggression, various types of risk-taking behaviors, higher numbers of sex partners, and several other similar traits (Bailey & Hurd, 2005; Cousins, Fugère, & Franklin, 2009; Garbarino, Slonim, & Snydor, 2011; Hönekoppa, Voracek, & Manning, 2006). The exact relationships between prenatal androgen exposure, personality, and behavior are still unclear. However, many of the same behavioral components related to low 2D:4D ratios have also been linked to the Dark Triad.

Qualities such as disagreeableness and risk-taking have been associated with the Dark Triad (Jonason & Tost, 2010). Additionally, individuals high in Dark Triad traits have a higher number of sex partners and are significantly more likely to employ short-term mating strategies (Jonason, Li, Webester, & Schmitt, 2009). This also includes intrasexual competition in the form of mate poaching, specifically males stealing mates from other males (Jonason, Li, & Buss, 2010). The overlap between characteristics commonly correlated with prenatal androgen exposure and with the Dark Triad may signify that prenatal androgens also play a role in the development of the Dark Triad traits, and this relationship should be investigated.

Facial Recognition

Personality traits within the Dark Triad have been identified from facial features in previous research. In a pioneering study, Holtzman (2011) created composite face prototypes of individuals who scored high in each component of the Dark Triad based on self- and peer-reports of personality traits. To create the face prototypes, Holtzman took the 10 highest and 10 lowest scoring males and females on each trait and used facial morphing software to combine neutral-expression photographs he took of them. These composite faces high and low in a given trait were placed side by side, and participants were asked to indicate which face they thought matched the defined trait. He found participants were significantly better than chance at distinguishing between faces high and low in specific components of the Dark Triad. This ability may have evolutionary benefits.

Holtzman proposed that identifying individuals high in the Dark Triad from facial features could be beneficial by allowing people to avoid the various types of exploitation common with individuals high in the three traits. However, if individuals high in the Dark Triad themselves are better than low Dark Triad individuals at identifying these faces, different evolutionary strategies could be at play. This seems particularly prudent to investigate when one considers the mating strategies associated with high Dark Triad individuals.

Hypotheses

While these components each have their own individual pieces, they also overlap with each other in

several domains. Jones and Figueredo (2013) state that the overlapping components are manipulation and callousness. In addition, a general lack of empathy seems to exist in all three of the Dark Triad Traits. The connections between all of these traits and behaviors lead to questions about similar developmental origins. Based on these ideas, we developed the following hypotheses:

1. Participants high in the Dark Triad would be significantly better at picking out other individuals high in the Dark Triad from facial features than individuals low in the Dark Triad.
2. Individuals high in the Dark Triad would be significantly better at picking out individuals high in short-term mating and intrasexual competition, but significantly worse at picking out individuals high in long-term mating based on facial features than individuals low in the Dark Triad.
3. Individuals high in the Dark Triad would have been exposed to higher levels of prenatal androgens, as evidenced by a lower 2D:4D ratio, than individuals low in the Dark Triad.

Method

Participants

For this study, participants were recruited from undergraduate psychology courses at a small Midwestern university. A total of 66 students (Age: M = 20.02, SD = 4.09), 17 males and 49 females, participated in this study for course credit. The majority of the sample was White (n = 52), followed by Hispanic (n = 11), Black (n = 2), and Asian/Pacific Islander (n = 1). All IRB procedures and guidelines were followed over the course of this study.

Materials

The materials used in Holtzman (2011) were obtained and used to construct a PowerPoint slideshow with faces high and low in the following traits: psychopathy, narcissism, Machiavellianism, intrasexual competition, short-term mating, and long-term mating. Each slide consisted of two faces of the same sex, with one face being high and one face being low in a single trait. Each photo was labeled Photo A or Photo B. In total, there were six personality traits examined, which resulted in 12 slides (6 traits for each sex). The trait order and the correct answers were counterbalanced across three separate slideshows. On the survey, participants were asked to mark which face was most expressive of each given trait on a 6-point scale (1 = Photo A is definitely the highest, 6 = Photo B is definitely the highest). Definitions for each trait were provided on the answer sheet. A demographics page was included, along with a space for researchers to record the participant's 2D:4D ratio. Finally, the Dirty Dozen measure of the Dark Triad was included (Jonason & Webster, 2010).

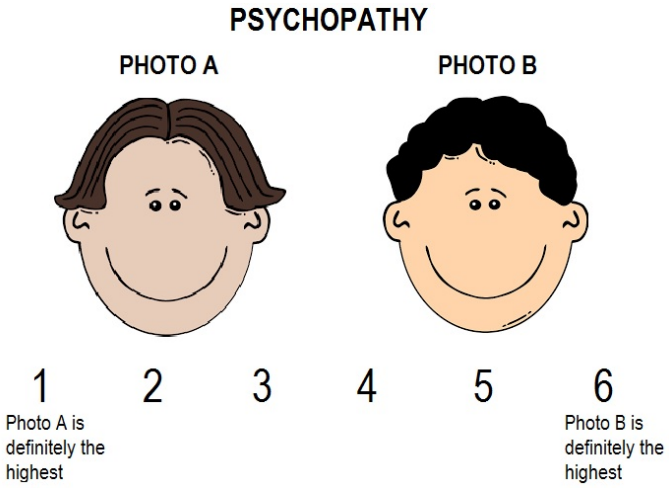

Figure 1. Conceptual example of the facial identification task used in the study.

Procedure

After arriving for their scheduled session, students were asked to provide their consent to participate and were given chance to ask questions about the nature of the study. Participants were given the survey for their condition, and the experimenter thoroughly explained the slideshow (with an example slide), making sure participants clearly understood how to rate the pictures. Verbal definitions for each trait were given for each slide in addition to the written definitions on the survey. After finishing the slideshow, participants filled out the demographic and Dark Triad measures. Upon completion, the participants turned in the surveys, and the 2D:4D ratios on their right hands were measured with digital calipers. The participants were then debriefed and allowed to ask any questions.

Results

Data Structuring

Prior to analysis, all face ratings were recoded so higher values on the six-point Likert scale represented a more accurate estimate, with "6" representing a response of absolute confidence in the correct answer. Mean values for the three subscales of the Dirty Dozen were computed for each participant (Possible Range = 1-5 for each subscale).

Main Analyses

Hypothesis one. To test hypothesis one, the three Dark Triad traits were correlated with participants' Likert scale responses on the facial recognition tasks for male and female faces varying in the same three Dark Triad traits (Machiavellianism, narcissism, and

psychopathy). Individuals high in the different aspects of the Dark Triad were not significantly better at picking out other individuals high in the Dark Triad from facial features.

	Male Faces			Female Faces		
	M	**P**	**N**	**M**	**P**	**N**
M	0.04	0.11	-0.01	-0.07	-0.15	-0.04
P	-0.14	0.09	0.00	-0.03	0.01	0.05
N	-0.04	0.12	0.04	0.19	0.14	0.19

Note. Shaded cells indicate statistically significant correlations at the $p < .05$ level. M=Machiavellianism, P=psychoticism, N=narcissism.

Figure 2. Correlations between ratings on Dark Triad facial identification task and Dark Triad traits for male and female facial stimuli.

Hypothesis two. Our second hypothesis was partially supported. Females high in the Dark Triad were significantly worse at picking out males high in long-term mating as we expected, $r(47) = -.29$, $p = .044$. Individuals high in the Dark Triad were not significantly better at picking out individuals high in short-term mating or intrasexual competition. However, males high in only narcissism were significantly better at picking out females high in short-term mating, $r(15) = .48$, $p = .050$, and significantly worse at picking out females high in long-term mating, $r(15) = -.61$, $p = .010$. Females high in narcissism were also significantly worse at picking out males high in long-term mating, $r(47) = -.48$, $p = .001$.

	Male Faces			Female Faces		
	ISC	**LTM**	**STM**	**ISC**	**LTM**	**STM**
M	0.15	0.00	0.09	0.07	0.05	0.01
P	-0.15	0.05	-0.04	-0.10	-0.06	0.15
N	0.05	-0.37	0.20	0.03	-0.05	0.10

Note. Shaded cells indicate statistically significant correlations at the $p < .05$ level. M=Machiavellianism, P=psychoticism, N=narcissism, ISC=intrasexual competition, LTM=long-term mating strategy, STM=short-term mating strategy

Figure 3. Correlations between ratings on competition and mating strategy facial identification task and Dark Triad traits for male and female facial stimuli.

Hypothesis three. In accordance with the literature, females in our sample had a significantly higher 2D:4D ratio than males, $t(64) = -2.28$, $p = .026$; $d = 0.63$. However, our third hypothesis was not supported: individuals high in the Dark Triad composite *did not* have significantly lower 2D:4D ratios, indicating higher levels of prenatal androgen exposure (all rs < .23, all ps > .07). Interestingly, males high in narcissism did have significantly higher (more female-typical) 2D:4D ratios, $r(15) = .59$, $p = .012$.

Exploratory Analyses

In the Holtzman (2011) study, participants were asked to rate faces on an 11-point scale from "definitely picture A" to "definitely picture B", with a rating of 6 indicating indifference. Holtzman then computed average values for each participant across all of the categories of faces (e.g., psychopathy, Machiavellianism, narcissism, etc.). This allowed Holtzman to make conclusions about the percentage of respondents who were accurate at face recognition "above chance" by looking at whether each respondent's mean rating was above 6; ratings were re-coded so higher ratings were consistent with the objectively correct answer. Using this methodology, Holtzman determined 75% of participants were able to detect the Dark Triad faces at a rate significantly better than chance. For this study, a similar procedure was followed in order to compare our sample and results with those of Holtzman. This present study used a 6-point rating scale without a midpoint. Average ratings were calculated across faces for each participant. Then, we examined the percentage of participants with average ratings above 3.5 (the arithmetic midpoint). The results showed 81.8% of participants had mean accuracy ratings above chance, compared to 75% in a similar analysis for Holtzman

An exploratory analysis was also run to examine accuracy more closely. Specifically, recognition was assessed on a trait by trait basis as opposed to the aggregate scores in the preceding analysis. Using this analysis it was discovered participants were able to accurately identify male intrasexual competition, female intrasexual competition, female Machiavellianism, female narcissism, male psychopathy, female short-term mating, and male short-term mating faces at a rate significantly better than chance (see Figure 4). In addition, female long-term mating, male Machiavellianism, male narcissism, and female psychopathy detection rates were also above chance, although not significantly. This suggests some characteristics of these faces are acting as a cue for each of these traits, and participants are able to recognize these cues in emotionally-neutral expressions. Importantly, detection accuracy in our study was highest for the faces related to mating, specifically the faces representing both male and female intrasexual competition and short-term mating. Based on these high accuracy rates, it may be inferred that the most salient cues derived from facial features are cues representative of different mating strategies. This could be important for a number of reasons.

Face Category	Accuracy	χ^2
Female Intrasexual Competition	74.24%	15.52*
Male Intrasexual Competition	71.21%	11.88*
Female Long-Term Mating	57.58%	1.52
Male Long-Term Mating	33.33%	7.33‡
Female Machiavellianism	68.18%	8.73*
Male Machiavellianism	56.06%	0.97
Female Narcissism	75.76%	17.52*
Male Narcissism	53.03%	0.24
Female Psychopathy	59.09%	2.18
Male Psychopathy	77.27%	19.64*
Female Short-Term Mating	77.27%	19.64*
Male Short-Term Mating	75.76%	17.52*

Note. * denotes statistical significance at the .05 level. ‡ denotes statistical significance, but in the opposite predicted direction

Figure 4. Exploratory analysis on the accuracy of face recognition on a trait by trait basis.

Conclusions

Although the Dark Triad traits are not seen as socially desirable, they may provide evolutionary advantages. It may be beneficial for individuals high in the Dark Triad to be able to pick out other individuals high in the Dark Triad based on facial features because of the relationship between the Dark Triad and short-term mating. Individuals high in the Dark Triad may benefit from being able to find others interested in short-term mating quickly and easily. Additionally, because of their perceived predatory nature, it may be beneficial for individuals high in the Dark Triad to recognize and avoid other predatory individuals because of the threats these individuals could pose to them in social and mating domains.

Individuals high in the Dark Triad were not significantly better at picking out Dark Triad traits from facial features despite these possible evolutionary benefits. This may be because of a small sample size and low overall scores on the Dark Triad measure, which could have affected the ability to find statistical significance. However, significant relationships were found between females high in the Dark Triad and long-term mating and individuals high in narcissism and short-term and long-term mating. The overall scores on narcissism were higher than the scores on psychopathy and Machiavellianism for this sample. This may be why relationships were found for narcissism and not for the other two components.

Exploratory analyses revealed significant detection of Dark Triad and related traits from facial features. It is clear some facial characteristics are acting as cues to these personality traits, and that individuals are able to detect these cues at rates above chance. It is not clear at this time exactly what facial characteristics are helping participants to detect these traits. However, future research should attempt to determine these cues to understand how Dark Triad traits are being detected, and also to determine if other personality traits are similarly identifiable from facial features.

The hypothesis that a lower 2D:4D ratio would be negatively correlated with the Dark Triad was not supported, and when the traits were examined separately, narcissism was actually linked to a more female-typical 2D:4D ratio. Although the previous research on prenatal androgen exposure and behaviors often correlated with the Dark Triad traits would suggest higher levels of prenatal androgen exposure would be correlated with higher levels of Dark Triad traits, some research has actually found the opposite to be true (Blanchard & Lyons, 2010).

This current study has limitations, including the small sample size and the disproportionate numbers of males and females in the sample. As with much psychology research using undergraduate students as a sample, there are a disproportionate number of females in the study. Related to this limitation are the low average scores on the Dark Triad components as a whole. As males tend to score higher on Dark Triad measures than females (Jonason & Webster, 2010), the small number of male participants in this study may be the reason for these overall low scores. Despite the lack of power caused by the small number of males, the finding of significant relationships in both males and females related to the recognition of short-term and long-term mating faces suggests that some sort of facial features are serving as a mating cue for these individuals. Finally, the sample consisted of college students from a small Midwestern university. Future research should attempt to examine the relationship between prenatal androgen exposure, the Dark Triad, and facial recognition of personality traits on a larger and more diverse sample

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CHILDREN'S FALSE MEMORIES IN VISUAL CONTEXT

EMILY HAHN AND KENITH V. SOBEL

UNIVERSITY OF CENTRAL ARKANSAS

Abstract - While children tend to have more false memories than adults in various tasks, one exception is the DRM paradigm. In the well-known DRM paradigm, participants study words such as sugar, cake, pie, sour, et cetera, that are related to a non-studied word (i.e., "sweet"). Then, participants are asked about words they have previously studied, non-studied associated words, and new words. In this context, children typically have fewer false memories than adults. Words are arranged in semantic networks in the brain such that activation of one-word spreads to other words with similar meanings. As a result, studied words raise the mental activation of non-studied associates. Children's semantic networks are not as developed as adults, so they tend to have fewer false memories for non-studied associated words than adults. In this study we extended the DRM to a visual format with children as participants. Members of categories (e.g., a circle, square, triangle that are all shapes) are semantically related to each other, whereas parts of a whole (e.g., eyes, ears, and nose are all parts of a face) are visually related. Because children's semantic networks are less developed than for adults, we hypothesized that children would have fewer false memories for missing category members than missing parts of a whole. Our results showed the opposite pattern, with children having more false memories for non-studied category members than parts of a whole. To explain this counterintuitive outcome, we suggested that children may have (1) noticed a part was missing from the studied whole, or (2) filled in the missing part so their mentally constructed version of the missing part clashed with the version we showed them at test, or (3) a combination of both. A limitation of our experiment is that we are unable to distinguish between these explanations, but this points the way forward for future research.

False memories occur when events are remembered that never took place (Gleaves, Smith, Butler, & Spiegel, 2004), and are important to distinguish from true memories for a number of reasons, particularly in real-world settings (Roediger & McDermott, 1996). For example, an eyewitness to a crime who has a false memory could implicate an innocent person. To better understand how false memories arise, it is essential to know how memories form. Although children have been shown repeatedly to have more false memories than adults (Brainerd & Reyna, 2002), there is one kind of task in which children have *fewer* false memories than adults: the well-known Deese (1959) Roediger and McDermott (1995)—or DRM—experimental paradigm.

Like other memory paradigms, the DRM includes an initial study phase and a subsequent test phase. In the study phase, participants are presented with lists of words that each have a common theme (e.g. sugar, cake, pie, ice cream, etc.). During the test phase, participants are presented with words they had studied (i.e., old words, such as sugar), words they had not studied (i.e., new words, such as anger) and non-studied words which are related to studied words (i.e., missing words, such as sweet). Adults are much more likely than children to falsely recognize missing words in a DRM experiment (Roediger, McDermott, & Robinson, 1998).

To understand why this difference is seen between adults and children, it is worthwhile to consider the reason that missing words elicit false memories in the first place. Words are presumed to be stored in semantic networks in the brain, such that words with similar meanings are near to each other in the network (Collins & Loftus, 1975). Activation of one brain region spreads to nearby brain areas, which are linked within *associative*

networks (Hebb, 1949). Associative networks can be activated during spreading activation. Spreading activation happens when one word activates the brain areas associated with that word (Collins & Loftus, 1975) and also spreads to brain areas associated with semantically related words (Roediger, McDermott, & Robinson, 1998). Each word in the 'sweet' list is semantically related to the word sweet, so after hearing all the words in the list, the brain areas associated with 'sweet' will receive higher activation, perhaps to the same degree as if the participant had actually been presented with the word 'sweet' itself. Because adults have semantic networks that are more developed than children's semantic networks, semantic similarity generates more brain activation for missing words in adults' brains than in children's brains (Warren, Price, Shelton, Reed & Williams, 2008). Therefore, adults are more likely to have more false memories for semantic associates than children.

Stimuli that are presented in different formats are encoded differently in memory (Huff, Bodner, & Fawcett, 2015), with visual stimuli leading to more accurate responses (Olszewska & Ulatowska, 2013). In this study we seek to better understand the visual memory of children (ages three to five) for items that are (1) semantically related to each other as members of the same category, or (2) parts of the same whole object. Categories are made up of concepts, or mental representations, that are grouped together based on meaning. There can be many members in a category. Whole figures contain parts, and are grouped together because each part makes up a portion of the whole. We hypothesized that children would have significantly more false memories for parts of a whole than members of missing categories. Falsely remembering a non-studied member of a studied category is the result of semantic similarities, but falsely remembering a non-studied part is the result of visual membership. During the study phase, children were shown a series of images. They saw sets of slides, each containing several members of a category or a whole figure. One category member or one part of the whole could be missing from the studied slide. During the test phase, children were shown images and asked if they recognized them. Test images included old items (items participants had studied), missing items (images related to studied items that had been removed from the studied slide), and new images (images they had not studied).

Methods

Participants

Participants were 28 children at the University of Central Arkansas Child Study Center (15 male, 13 female), between the ages of three years, three months, and five years, six months (M = 4 years, 10 months). The children's parents were presented with an informed consent form and provided written permission for the child to participate. The children who agreed to participate gave verbal assent. All participant interactions were reviewed and approved by the university Institutional Review Board and complied with the ethical standards described by the American Psychological Association (2010).

Materials

For each condition (categories and parts of a whole), six sets of simple line figures were constructed and imported into Microsoft PowerPoint. The children's responses ("yes" or "no") were recorded on a data sheet created in Microsoft Word. The test images were counterbalanced across participants, so images that were old for one third of participants were missing images for the second third of participants, and new for the final third of participants. The order of slides in the experiments were randomized between participants. Each child was given a toy as a reward for their participation.

An example of categories was "shape". One third of participants studied the image in the upper panel of Figure 1 that included a circle, square, star, triangle, diamond, and rectangle; one third of participants studied the category in the lower panel in Figure 1 from which the circle had been removed; one third of participants did not study the "shape" category.

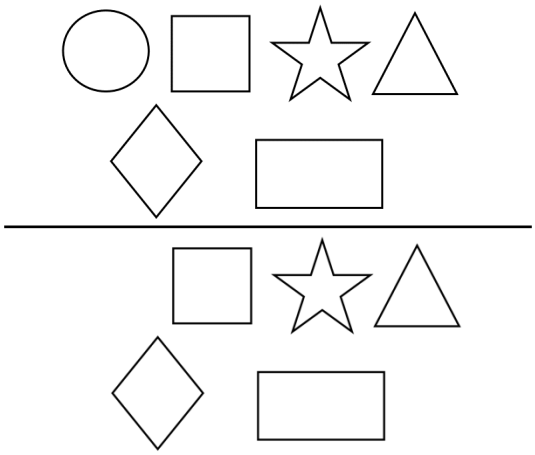

Figure 1. The category "shapes" with all members present (upper panel) and with one member missing (lower panel).

The other five categories were transportation, animals, food, school items, shapes, and colors. An example of a visual whole is "face". One third of participants studied the image in the upper panel of Figure 2; one third of participants studied the image in the lower panel of

Figure 2 from which the nose had been removed; one third of participants did not study the "face". The other five visual wholes were house, playground, tableware set, outfit, and school bus.

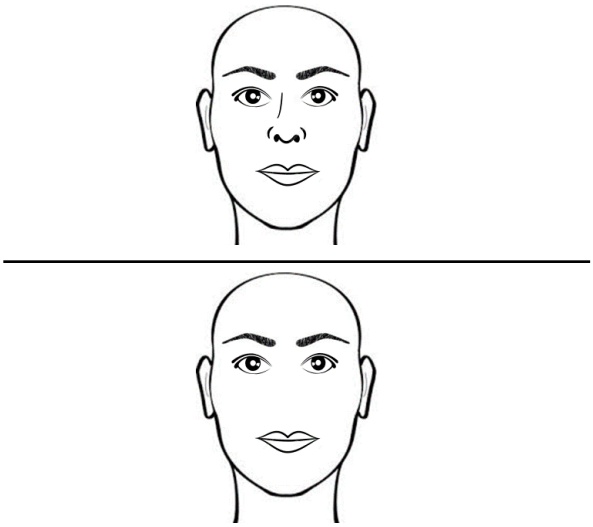

Figure 2. A whole "face" with all pieces present (upper panel) and with one part missing (lower panel).

Procedure

After Informed Consent was obtained from children's parents, participants were asked for verbal assent. Children's names, ages, and genders were recorded on a datasheet, and confirmed with the Child Study Center. In the category condition participants viewed two categories with six members, and two categories with one item missing. In the parts of a whole condition participants viewed two visual wholes and two visual wholes with one part missing. Condition order was counterbalanced across participants. In the test phase, which participants were shown images and asked if they recognized them. Two of the test images were old, two were missing, and two were new. After both conditions were completed (categories and parts of a whole), children were debriefed, and rewarded with a toy donated from the local McDonald's office.

Results

We submitted the mean number of "yes" responses (depicted in Figure 3) to a 2 x 3 x 2 ANOVA with membership (categories/parts of a whole) and test slide (old/missing/new) as within-subjects variables, and presentation order (categories first or parts of a whole first) as a between-subjects variable. The main effect of presentation order and all interactions with presentation order as a factor were not significant, all *p*s > .1. The significant main effect of test slide, $F(2, 54) = 3.4$, $p = .039$, $\eta_p^2 = .11$, indicated that responses varied across conditions. The effect of membership was not significant ($p > .1$), but the test slide x membership interaction was significant, $F(2, 54) = 3.52$, $p = .037$, $\eta_p^2 = .12$. The interaction appears to be driven by different 'missing' responses in the two membership conditions. Contrasts confirmed that missing slides were significantly more often falsely recognized in the categories condition than the parts of a whole condition, $F(1, 54) = 7.0$, $p = .013$, $\eta_p^2 = .11$.

Discussion

Interestingly, the results were counterintuitive to our original hypothesis. Initially, we expected children would be more likely to falsely recognize missing parts of a whole than category members. However, the significant interaction and contrast means that children falsely recognized more missing members of categories than parts of a whole. As can be seen in Figure 3, the

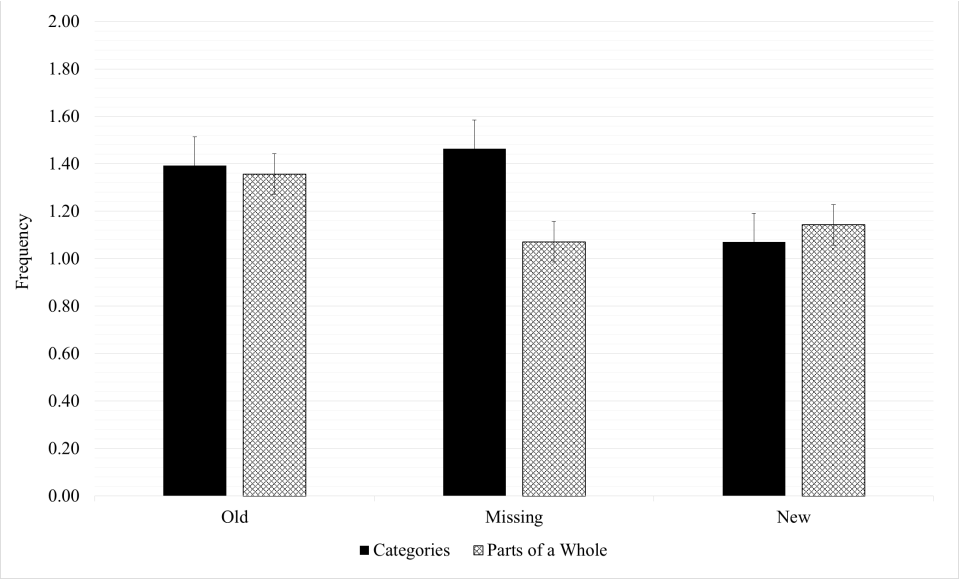

Figure 3. Frequency of "yes" responses, indicating recognition for two membership conditions (categories, parts of a whole) and three slide types (old, missing, and new). A "yes" response would be an accurate memory for the old slides, but a false memory for missing and new slides. Error bars represent standard error of the mean.

significant interaction indicates that missing slides elicited more "yes" responses in the category condition than the parts of a whole condition.

To explain why children had more false memories for missing category members than missing parts of a whole, it is important to consider the difference between categories and parts of a whole. For instance, if a circle is removed from the set of shapes, the remaining items in the set still represent the category "shape". Therefore, each individual item is not essential to the category. On the contrary, if a face is missing a nose, it would be clear that there is a missing part, since the whole is clearly incomplete without all of its parts. At test, the participant would remember that the part had been missing and reject the test item (e.g., "I remember that a nose was missing, so I will say 'no' to that nose"). Another way to explain why children falsely recognized more category members than parts of a whole is that perhaps children visually filled in the missing part. If so, at study, the part we showed them would have clashed with their filled-in version. When filling in the space for the missing feature, each child may have different mental representations of what the nose should look like. Then, in the test phase, the presented part would look different from the versions they had filled in and they could reject the test item.

One limitation of this study is that we cannot distinguish between the two accounts to explain our results: Do children notice that a part is missing, do they fill in the missing part, or do they do both? Perhaps a follow-up experiment could answer this question by changing the test task. Instead of recognition, children could be asked to draw what they saw. If they inserted the missing part of the drawing, that would support the missing filling-in explanation, and if not, that would support the explanation that they noticed a missing part. However, even this kind of experiment could not tell whether children both noticed a missing part and filled it in.

A second limitation of this study is that more demographic information beyond age and sex should be gathered. It would be beneficial to gather data about ethnicity and socioeconomic status (SES) because these participant variables are essential in identifying what populations are being tested. In addition, it would be informative to test how this information might influence the outcome of the results.

A third limitation of this study is the number of participants. In future studies, if more participants were included, perhaps the effect of membership (categories versus parts of a whole) would be significant. Additionally, if adults participated, we could compare performance as a function of age. Future aims would involve investigating differences between children and adults. Considering that children have variations in false memories for categories and parts of a whole conditions, would there be a similar trend in missing items with adults?

This study contributes to the scientific inquiry regarding false memories because most studies have looked at verbal items rather than visual stimuli. Many of the comparisons involve semantic word lists, which highlight differences in how children and adult remember studied words. However, little work has been done to show how concepts or whole figures are processed in simple visual contexts.

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CAUCASIAN AND AFRICAN-AMERICAN ADULTS' PERCEPTIONS OF POLICE IN ST. CROIX AND THE U.S. MAINLAND

SAVANNAH M. PEWETT AND MERRY J. SLEIGH

WINTHROP UNIVERSITY

Abstract - Perceptions of police officers have received intense media attention in recent years, particularly in the context of minority populations. Perceptions seem to be based on many factors, including citizens' individual expectations of how police should behave, and these perceptions seem to be heavily resistant to change. United States and St. Croix adults (n = 117) provided their perceptions of a narrative describing the robbery of a backpack and a police apprehension. Participants also responded to several scales to assess perceptions of police officers, perceptions of neighborhood culture, and symbolic racism beliefs. Results revealed that United State mainland adults, compared to St. Croix residents, had more favorable perceptions of the police despite being more likely to report negative interactions with police officers. Although their perception of the police differed, adults from both cultures reported very similar reactions to the criminal narrative. Caucasians, compared to African-Americans, had more positive perceptions of and past experiences with police. Higher socioeconomic status, higher education levels, and higher symbolic racism scores predicted more positive perceptions of police. This study provides a new comparison of these two cultures and offers further evidence that culture, race, and personal experience influence perceptions of law enforcement.

Perceptions of police officers have received intense media attention in recent years, particularly in the context of minority populations (Bowen, 2015). There is strong evidence suggesting that perceptions of police officers are based on a myriad of factors including personal experience, race, and socioeconomic status (Maxson, Hennigan, & Sloane, 2003; Weitzer & Tuch, 2004). To a large extent, the basis of these perceptions is an individual value judgment assessing how a police officer behaves in light of how the perceiver believes the officer should have behaved (McDowell, 1984; Rosenbaum, Schuck, Costello, Hawkins, & Ring, 2005). Once established, citizen perceptions seem to be firmly held and not easily modified based on the specific tactics that police employ (Perkins, 2016; Ratcliff, Groff, Sorg, & Haberman, 2015; Sahin, Braga, Apel, & Brunson, 2016).

One of the most influential factors in value judgments about police officers is a person's personal experience with the police. The empirical evidence, in general, demonstrates that negative experiences with the police are associated with negative attitudes toward the police (Huebner, Schaferb, & Bynum, 2004; Schuck & Rosenbaum, 2005). In fact, negative experiences have a stronger effect on creating negative perceptions than positive experiences have on creating positive perceptions (Weitzer & Tuch, 2004). Additional research suggests that personally witnessing a negative police-citizen interaction can also led to negative perceptions of the police (Rosenbaum et al., 2005). Impersonally witnessing police-citizen interactions through watching television news and crime-based entertainment improves perceptions of police, because these depictions typically present police officers in a favorable light (Callanan & Rosenberger, 2011).

Some communities tend to hold more negative perceptions of the police, perhaps as a result of their increased contact, and thus personal experience, with police officers. For example, individuals in low socioeconomic status (SES) housing situations, characterized by high crime, more often express negative attitudes toward police officers than individuals in higher SES housing (Taylor, Kelly, & Salvatore, 2010; Weitzer & Tuch, 2004). Similarly, residents of high-crime, low SES neighborhoods are more likely to believe police are

corrupt compared to their higher SES counterparts (Parker, Onyekwuluje, & Murty, 1995). Wu, Sun, and Hu (2016) found the same pattern in China, with high SES being one of the strongest predictors for trust in police. Even the perception of living in a high-crime area can drive perceptions. Weitzer and Tuch (2004) found that people who perceived that their neighborhood as a high-crime area reported more police abuse and more negative attitudes toward the police. Antrobus, Bradford, Murphy, and Sargeant (2015) recently confirmed the idea that individuals' attitudes toward the police link closely with the attitudes of their local community.

Yet another powerful variable that drives perceptions of police is race and ethnicity, factors that are often intertwined with issues related to community attitudes and personal experience with the police. Sampson and Bartusch (1998) examined neighborhood-level perspectives of police and found divides along racial lines; minorities, particularly African-Americans, reported lower levels of satisfaction with the police compared to Caucasians. Minority group members were also much more inclined than Caucasians to perceive police brutality as a serious problem. Scaglion and Condon (1980) argued that African-Americans harbor more complex perceptions of the police because of their more frequent interactions, while Caucasians, particularly upper-middle-class, hold oversimplified perceptions of the police because their opinions tend to be based on the media and television rather than on direct experiences with the police.

Recent research supports and expands on these earlier findings. Chaney and Robertson (2013) found that African-Americans were more likely than Caucasians to have been confronted while driving a motor vehicle, a situation that led to the emergence of the phrase "Driving While Black." These researchers also found that African-Americans were more likely than Caucasians to make complaints about police brutality (Chaney & Robertson, 2013). Mistrust between minorities and police are so long-standing that hostility toward police has become a common element of identity development in minority youth (Lee, Steinberg, Piquero, & Knight, 2010).

Despite extensive focus on Caucasian and African-American citizens, less is known about Latino and Hispanic individuals' perceptions of the police. Walker and Katz (2012) found that Latino perceptions of the police are more positive than those of African-Americans but more negative than those of Caucasians. Heubner, Schaferb and Bynum (2004) cautioned that Latinos are not a homogenous group, and perceptions may differ across region and country of origin, and recent research supports this notion. Roles, Moak, and ten Bensel (2016) found that the police perceptions of Hispanic people in the United States depend on country of origin and legal status, with Mexican Hispanics and legal immigrants reporting the most positive attitudes.

In addition to personal experience and race, researchers have found that perceptions of police officers can be predicted by many other factors. For example, Huebner, Schaferb, and Bynum (2004) found that being younger, less educated, and male resulted in higher negative perception scores compared to those from older, formally educated, and female participants; this negative perception was enhanced if the individual had personal and unpleasant past contact with police officers. Marital status also influences perceptions of police officers. Citizens who own their own property and who are married have "more to lose" and have a bigger investment in their community. Thus, they tend to hold more positive perceptions of the police whose role is to protect the community (Huebner, Schaferb, & Bynum, 2004). This argument is supported by earlier research that demonstrated that citizens who were more invested in their community were more supportive of the police (Brandl, Frank, Worden, & Bynum, 1994).

A significant complicating factor when trying to understand police perceptions is the intertwined and simultaneous existence of many of these researched variables. Wu (2014) recently examined perceptions of police across different ethnic groups and found that complex perceptions depend on many factors from individual experiences to community norms. In contrast to previous findings, Wu (2014) also reported that individuals with more education had lower levels of satisfaction with police. Wu (2014) argued that people with more education tend to have liberal orientations, a deeper understanding of social justice, and increased concern with police discrimination, which may lead to the lower levels of police satisfaction.

Despite the extensive research related to factors influencing perceptions of the police, little research has examined culturally-based differences in perceptions. As early as 1971, Jacob argued that collective cultural beliefs may be a powerful aspect in shaping perceptions of the police. He argued that justice depends on the expectations of the consumers, their perceptions of what treatment others receive, and their own experiences. One recent study examined perceptions of police legitimacy in the United States and Ghana (Tankebe, Reisig, & Wang, 2016). The results revealed that United States participants were, in general, willing to cooperate with police even if they did not believe in the legitimacy of police authority, whereas in Ghana, people were only willing to cooperate if they also perceived the police

authority as legitimate. Tankebe, Reisig, and Wang (2016) argued that U.S. participants were cooperating with the police as an exercise of self-control despite their concerns about legitimacy, while Ghana participants did not have the same perceived societal obligation for obedience. In another cross-cultural study, Sun, Su, and Wu (2011) found that compared to Chinese college students, American college students expected police to be more proactive in their responsiveness to domestic violence.

One goal of the current study was to help fill this gap in the literature by comparing how citizens of St. Croix and the United States perceived police officers and a narrative describing a criminal situation. Research on St. Croix residents is somewhat restrictive. In recent years, most has focused on health care issues (Callwood, Campbell, Gary, & Radelet, 2012; Lucea, Francis, Sabri, Campbell, & Campbell, 2012; Mohammed et al., 2010), HIV (Draughon et al., 2015; Stockman et al., 2013; Surratt, 2007; Surratt, Inciardi, Weaver, & Falu, 2005), and domestic violence (Sabri et al., 2014).

The previously researched topics provide some insight into the St. Croix culture. The majority of women have experienced some type of domestic violence (Stockman et al., 2013), and outside of Africa, the Caribbean has the highest rate of reported HIV cases (UNAIDS, 2009). In general, the health status of St. Croix residents is worse than that of adults on the U.S. mainland, and the small size of the island creates a sense that "everyone knows everyone else's business" (Callwood et al., 2012). Education and SES levels are lower in St. Croix than the mainland resulting in greater economic instability for the island (U.S. Census Bureau, 2010). Perhaps as a result of economic hardship, St. Croix has high crime rates and is, thus, one of the most dangerous Caribbean islands on which to live (St. Croix Foundation, 2014).

Our secondary goal was to see if symbolic racism and past experience with police officers predicted attitudes toward the police. Symbolic racism is a belief system that reflects subtle prejudice towards African-Americans and minorities (Sears & Henry, 2003; Sniderman & Tetlock, 1986). Symbolic (or modern) racism is typically expressed in an indirect manner, such as opposing affirmative action because of the potential for reverse discrimination, rather than through outright hostility toward another race (Nail, Harton, & Decker, 2003). Traditional racism is more directly expressed and often contradict contemporary social norms, such as publicly supporting segregation (Nail, Harton, & Decker, 2003). Adults high in symbolic racism belief are likely to support strict and punitive crime policies and less likely to support preventative crime polices, like rehabilitation (Green, Staerkle, & Sears, 2006). Because minorities tend to have negative experiences, and hold negative perceptions of the police, those who hold symbolic racism beliefs are likely to favor police officers when minority-citizen and police conflict occurs.

We hypothesized that:

a) United States mainland participants would have higher negative perceptions of the police compared to St. Croix participants. Many factors in St. Croix culture would be expected to link to negative attitudes toward the police; however, the negative media attention that police officers have received in the U.S. Mainland (at the time of this study) is much more extensive. In addition, as we researched St. Croix, we found numerous newspaper reports relaying the difficulty of recruiting and keeping adequate police presence.
b) For the same reason, United States mainland participants would have more intense and negative reactions to a narrative describing police responding to a crime scene than St. Croix participants.
c) In line with previous research, African-Americans, regardless of country of residence, would have more negative perceptions of police officers compared to Caucasian participants.
d) As a reflection of favoring societal establishments over minorities, participants higher in symbolic racism would have more favorable perceptions of police officers than participants lower in symbolic racism.

Method

Participants were 20 St. Croix residents and 97 United States (mainland) residents. Participants were recruited through personal contact, social media forums, and undergraduate classrooms, drawing primarily from a mid-sized Southeastern university in the United States and a small Caribbean university located on St. Croix. The mean age of the participants was 23.50 (*SD* = 8.94), with a range of 18 to 64 years. The sample consisted of: Caucasians (41.9%), African-Americans (26.4%), Hispanics/Latinos (8.5%), and Crucians (7%). (It may be helpful to note that people living in St. Croix do not automatically consider their ethnicity to be Crucian.) The remaining participants reported other ethnicities or did not provide a response. Reflecting the differences between the two cultures, our two samples had unique demographic characteristics. For example, the St. Croix sample was older and had lower levels of SES and educational attainment than the U.S. mainland sample. Comparison demographics can be seen in Table 1.

Table 1

Percentage of Responding U.S. Mainland and St. Croix Participants in Self- Reported Demographic Categories

Demographic Category	U.S. Mainland	St. Croix
Age	22.72 (*SD* = 7.38)	27.61 (*SD* = 14.27)
Male	13.4%	35%
Female	86.6%	65%
African-American	32%	15%
Caucasian	51.5%	20%
Hispanic	7.2%	20%
Crucian	2.1%	35%
Other race/ethnicity	7.3%	10%
11th grade or below	2.1%	30%
High school/GED	36.1%	35%
Associate's degree	16.5%	15%
Bachelor's degree	26.8%	10%
Master's degree	17.5%	10%
Doctorate degree	1.0%	0%
Lower-class	11.3%	20%
Low Middle Class	32%	25%
Middle-class	48.5%	40%
High Middle Class	8.2%	15%

This study was approved by the researchers' Institutional Review Board. All participation was voluntary, and the only compensation was that some participants received extra credit for taking the survey in an undergraduate course.

Materials and Procedure

Participants accessed the survey through Qualtrics and responded to the scales in the order they are presented here. Participants were first asked to read a scenario created by the researchers. The scenario described a woman being robbed and police apprehending the possible suspect. Following the scenario, participants were asked two factual questions about the scenario to confirm that they read and understood it (e.g., The woman's purse was stolen."). Participants then responded on a 5- point Likert-type scale with their level of agreement to 14 statements created by the researchers to assess their perceptions of the scenario. Five questions asked participants to evaluate the woman's responsibility in the situation (e.g., "The woman was to blame for the incident"). Three questions asked participants to evaluate the suspect's role in the situation (e.g., "The suspect was to blame for the incident"). Four questions asked participants to evaluate the police officer's role in the situation (e.g., "The police officer is a good person"). Two additional questions asked participants their level of agreement with the following two statements: "This situation was serious" and "The incident was violent."

Perceptions of the Local Police

We used the Perceptions of the Police questionnaire to assess participants' overall satisfaction of the police and to measure participants' assessment of specific areas of police work (Chow, 2012). The published reliability is .79 (Chow, 2012). The original scale consists of eight questions; we dropped one question that specifically referenced "Aboriginals," because we were concerned that participants might not understand this reference. Participants responded on a 5-point Likert scale, in which 1 represented "strongly disagree," and 5 represented "strongly agree." Responses were summed, resulting in a score from 7 to 35, in which a higher score represented more favorable perceptions of the police. We calculated a Cronbach's alpha of .80 for our seven-question survey, which is comparable to the reliability for the originally published scale.

Symbolic Racism

The Symbolic Racism 2000 Scale is a commonly used eight-item assessment tool to assess participants' racial attitudes toward African-Americans and other minority groups (Henry & Sears, 2002). The creators of the scale conceptualize it as having two factors; however, the scale results in a single score for each participant. The first factor examines traditional racial attitude (e.g., "It's really a matter of some people not trying hard enough; if blacks would only try harder they could be just as well off as whites"). The second factor examines political predisposition (e.g., Over the past few years, blacks have gotten more economically than they deserve"). Participants responded on either a 5-point Likert scale in which 1 represented "strongly disagree," and 5 represented "strongly agree" or on a 4-point Likert-type scale where 1 represented "All of it" and 4 represented "Not much at all." Negative items were reverse-scored such that a higher score represented a higher racism belief. The Cronbach's alpha coefficient ranges from 0.59 to 0.79 across all previous samples (Henry & Sears, 2002); we calculated a Cronbach's alpha of 0.83.

General Perceptions of the Police

The General Perceptions of the Police scale was used to assess participants' perceptions of the police by looking at multiple sub-scales, which included, Public Cooperation with Police, Police Legitimacy, Procedural Justice, and Police Effectiveness" (Reisig, Tankebe, & Mesko, 2014).

The first sub-scale, Public Cooperation with Police, consists of five items ranging from 1 (very

unlikely) to 4 (very likely). A sample question is, "How likely would you be to call the police if you saw someone break into a house or car?" The sum of the scale represents the participants' willingness to cooperate with legal authorities, with a higher score indicating greater willingness. The published reliability is 0.73 (Reisig, Tankebe, & Mesko, 2014). We calculated a Cronbach's alpha of 0.73.

The next sub-scale, Police Legitimacy, is a two-dimensional concept combining the concepts of "obligation to obey" and "trust in police;" however, the scale results in a single score for each participant. The scale consists of four items (e.g., "You should do what the police tell you to do even if you disagree"), and responses are made on a Likert scale from 1 (strongly disagree) to 4 (strongly agree). Scores are summed, and a higher score reflects a higher level of belief in police legitimacy. The published reliability is 0.63 (Reisig, Tankebe & Mesko, 2014). We calculated a Cronbach's alpha of 0.71.

Six survey items are used to construct the sub-set scale of Procedural Justice. These items reflect personal judgments the participants may have about how police officers treat citizens (e.g., "The police are courteous to people they come into contact with"). Response options ranged from 1 (strongly disagree) to 4 (strongly agree) with a higher score reflecting more positive perceptions of procedural justice. The established reliability is .77 (Reisig, Tankebe & Mesko, 2014); we calculated a Cronbach's alpha of 0.85.

The sub-scale of Police Effectiveness consists of five items. These items reflect the participants' perception of how the police are dealing with crime and disorder in their own neighborhood (e.g., "I feel safe walking in my neighborhood at night"). Response options ranged from 1 (strongly disagree) to 4 (strongly agree), with a higher score reflecting a positive perception of police effectiveness in dealing with crime and disorder. The established reliability is 0.71 (Reisig, Tankebe, & Mesko, 2014); we established a Cronbach's alpha of 0.72.

Neighborhood Street Culture

The neighborhood street culture questionnaire contains nine items in which participants are asked to evaluate the use of violence in their personal neighborhood (Stewart & Simons, 2010). Sample questions include, "If someone uses violence against you, it is important that you use violence against him or her to get even" and "People will take advantage of you if you don't let them know how tough you are." Responses were made on a Likert scale that ranged from 1 (strongly disagree) to 4 (strongly agree), with one item being reverse-coded. Responses were summed with higher scores representing more adherence to a street code of violence. The published reliability is .89 (Stewart & Simons, 2010). We obtained a Cronbach's alpha of .80.

Satisfaction with the Police (in neighborhood)

Satisfaction of the police was measured with five items (Sampson & Bartusch, 1998). Participants were specifically instructed to respond with the police from their neighborhood in mind (e.g., "The police in this neighborhood are responsive to local issues"). Responses were made on a Likert-scale that ranged from 1 (strongly disagree) to 4 (strongly agree), with one item being reverse-coded. A higher score represented a higher satisfaction of the police in the participants' neighborhoods. The established reliability ranges from .44 to .95 in established samples (Sampson & Bartusch, 1998). We obtained a Cronbach's alpha of .73.

Demographics

Seven demographic items assessed participants' sex, ethnicity/group of people that they identify with, their current location, the duration of how long they had been there, age, their childhood socio-economic class, and their parents' educational level.

Personal Experience with the Police

The participants were also asked two items about their personal experiences with the police (i.e., "I have personally witnessed police brutality"; "I have been the victim of police brutality"). Last, we asked one question, created by the researchers, to assess how participants viewed the police within the context of their society (e.g., "Police brutality is one of the biggest problems in today's society").

Results

We asked two factual questions about the scenario to assess whether participants carefully read and retained the information. Eighty-two percent of participants accurately responded to both questions correctly, and 14% of participants got at least one question correct. Less than four percent (3.9%) of participants answered both questions incorrectly. Participants who incorrectly answered both questions, suggesting they did not carefully read the scenario, were not included in the analysis related specifically to perceptions of the scenario. (These participants were included in the analysis of general perceptions of the police because these perceptions were not dependent on the scenario, and we wanted to maximize the diversity in the sample.)

We compared participants currently living in the U.S. with those living in St. Croix on perceptions of the scenario and the police perception scales using an independent *t*-test. Compared to St. Croix participants, US participants had higher cooperate with police' scores,

$t(115) = 2.53$, $p = .013$; police legitimacy scores, $t(114) = 2.35$, $p = .021$; police effectiveness scores, $t(114) = 2.52$, $p = .013$; local neighborhood scores, $t(115) = 2.81$, $p = .006$. U.S. participants had lower adopting the street code scores, $t(114) = -2.51$, $p = .014$ and regarding the scenario, were more likely to believe the woman was truthful about the incident, $t(115) = 2.22$, $p = .028$.

We compared Caucasians and African-Americans on perceptions of the scenario and on the police perception scales using an independent *t*-test. Compared to Caucasians, African-American participants had lower: symbolic racism scores, $t(86) = -3.01$, $p = .003$; cooperate with police scores, $t(86) = -4.17$, $p < .001$; police legitimacy scores, $t(86) = -2.26$, $p = .026$; procedural justice scores, $t(86) = -3.67$, $p < .001$; police perception score, $t(86) = -3.90$, $p < .001$; lower local neighborhood safety scores, $t(86) = -2.21$, $p = .030$. African-Americans had a higher adopt the street code score, $t(86) = 3.14$, $p = .002$. In response to the scenario we provided, African-Americans had higher victim blame scores, $t(86) = 2.67$, $p = .009$, and were less likely to believe that the police officer was a good person, $t(86) = -2.33$, $p = .022$.

When asked if they had witnessed police brutality, participants responded with strongly disagree (27.9%), disagree (29.5%), neutral (15.5%), agree (11.6%), and strongly agree (6.2%). Participants responded to the question about whether they had experienced police brutality with strongly disagree (47.3%), disagree (31%), neutral (6.2%), agree (3.9%), and strongly agree (2.3%). The means and standard deviations for our samples can be seen in Table 2. U.S. participants were more likely to say that they had been the victim of police brutality, $t(115) = 2.13$, p = .035, than were St. Croix residents. Compared to Caucasians, African-American were more likely to report having been the victim of police brutality, $t(86) = 2.25$, $p = .027$.

We compared men and women on perceptions of the scenario and on the police perception scales using an independent *t*-test. Compared to women, men had a higher adopting the street code score, $t(114) = 3.45$, $p = .001$. Compared to women, men rated the situation as less serious, $t(115) = -2.48$, $p = .014$.

We examined our hypothesis regarding symbolic racism and conducted some additional exploratory analysis using Pearson's correlations. Participants who were more likely to agree that they had personally witnessed police brutality had lower 'symbolic racism' scores, $r(116) = -.19$, $p = .037$; had lower cooperate with police scores, $r(117) = -.37$, $p < .001$; had lower police legitimacy scores, $r(116) = -.38$, $p < .001$; had lower procedural justice scores, $r(116) = -.53$, $p < .001$; had lower police perceptions scores, $r(117) = -.36$, $p < .001$; had lower local neighborhood scores, $r(117) = -.41$, $p < .001$; were more likely to agree that they had been the victim of police brutality, $r(117) = .60$, $p < .001$; and were more likely to agree that police brutality is one of the biggest societal problems, $r(116) = .28$, $p = .003$.

The higher the participants' symbolic racism score the higher the police legitimacy score, $r(116) = .32$, $p = .001$, the higher the procedural justice score, $r(116) = .49$, $p < .001$, the higher the police perception score, $r(116) = .51$, $p < .001$, the more they blamed the suspect, $r(116) = .21$, $p = .021$, the higher the local neighborhood score, $r(116) = .28$, p = .002, the less they agreed that they have personally witnessed police brutality, $r(116) = -.19$, $p = .037$, and the less they agreed that police brutality is one of the biggest societal problems, $r(116) = -.45$, p < .001.

The higher the participants' level of education the less people agreed that police brutality is one of the biggest societal problems, $r(116) = -.19$, $p = .043$. The higher the participants' childhood home socioeconomic status the higher the procedural justice score, $r(116) = .23$, $p = .012$ and the less likely they were to say they had been the victim of police brutality, $r(117) = -.19$, $p = .036$.

Table 2

Means and Standard Deviations for Personal Experiences with Police Across Cultures and Races

	I have personally witnessed police brutality.	I have been the victim of police brutality.
U.S Mainland	2.23 (1.14)	1.79 (1.01)*
St. Croix	2.8 (1.54)	1.30 (0.47)
African-American	2.44 (1.08)	2.15 (1.13)*
Caucasian	2.19 (1.18)	1.65 (.935)

$p < .05$

Discussion

We hypothesized that mainland participants would have more negative perceptions of the police than would St.

Croix residents. This hypothesis was not supported. United States mainland participants reported more positive perceptions of police on all variables measured. We also found that, compared to St. Croix residents, mainland participants reported higher levels of police victimization in the context of providing more positive perceptions of police officers. Previous research demonstrated that negative interactions with police typically lead to negative perceptions (Huebner, Schaferb, & Bynum, 2004; Schuck & Rosenbaum, 2005); however, our participants did not follow this expected pattern.

One possible explanation is that the negative perceptions held by St. Croix residents were driven by factors other than personal experiences. The 2010 U.S. Census revealed that education levels and socioeconomic status are very low in St. Croix, two factors associated with negative police perceptions in previous studies (Huebner, Schaferb, & Bynum, 2004; Taylor, Kelly, & Salvatore, 2010; Weitzer & Tuch, 2004; Wu, Sun, & Hu, 2016). In our study, lower levels of education predicted participants' perception that police brutality is one of the biggest problems in today's society, and the lower the socioeconomic status, the less participants felt that police are equally fair to all citizens. Perhaps education and income heavily influenced the perceptions of our St. Croix participants because of the negative and visible impact these two factors have on the St. Croix economy, thus being salient issues when assessing social situations. In addition, St. Croix is ranked as one of the most dangerous Caribbean islands to live (St. Croix Foundation, 2014). Feeling unsafe may lead to more negative feelings toward the police who, as Weitzer and Tuch (2004) argue, bear responsibility for the safety and danger of the community.

St. Croix residents also scored higher on adopting the street code, indicating that they felt it was important to personally take action when threatened or offended. These two variables may be intertwined. If St. Croix residents feel negatively toward the police, they may feel as if they have no choice but to handle problems on their own.

Our second hypothesis was that mainland participants would have more intense and negative reactions to the criminal narrative than would St. Croix. Once again, our hypothesis was not supported. Mainland and St. Croix participants had similar perceptions of our crime vignette with one exception. St. Croix residents were more likely to believe that the victim was being untruthful about the situation. This lower level of trust in the victim may have contributed to St. Croix residents' negative perceptions of police, as the scenario described the police apprehending the suspect based on the victim's testimony. The fact that the perceptions of the narrative were overwhelmingly similar is interesting in light of the cultural differences in perceptions of the police. These two cultural groups seem to perceive criminal situations in similar ways, but they do not have similar reactions to police presence.

We also hypothesized that African-Americans would have more negative perceptions of the police than Caucasians, which was supported. We found that Caucasians held more favorable perceptions, a result that matches previous research (Lee et al., 2010; Sampson & Bartusch, 1998; Weitzer & Tuch, 2004). Caucasians in our study were also less likely to report having been the victim of police brutality. Thus, Caucasians' positive perceptions may have been the result of more positive interactions, matching the link established in previous research (Schuck & Rosenbaum, 2005). This data adds to the mounting evidence of racial tension between police officers and minority citizens (Chaney & Robertson, 2013; Lee et al., 2010).

Our last hypothesis was that adults higher in symbolic racism would have more favorable perceptions of police officers than participants lower in symbolic racism. We found strong support for this prediction. Participants who had a higher symbolic racism score were more likely to rate police positively on all variables examined. They were also less likely to agree that police brutality was one of the biggest societal issues and that they had personally witnessed, or been the victim of, police brutality. In addition, those high in symbolic racism were more likely to blame the suspect in the criminal narrative. The pattern of these findings is logical, as demonstrated in previous research, less negative interactions with the police should result in more positive police perceptions (Huebner, Schaferb, & Bynum, 2004; Schuck & Rosenbaum, 2005). The blame that these individuals attributed to the suspect could be a reflection of the perception of society as being divided into superior and inferior groups, with those high in symbolic racism placing themselves in the superior category and looking down on others.

This study had limitations that must be considered when interpreting the data. The most obvious is that we had a disparate number of representatives from each culture, with St. Croix minimally represented. One reason for this inequality is that the internet connection on the island was inconsistent, possibly causing us to lose data and participants. The difficulties we encountered in recruiting participants in St. Croix may explain the limited research being conducted on this population.

A second limitation is that our samples were not truly random; thus, the samples did not perfectly reflect

each culture and were not demographically matched. For example, we had more women in our sample than men, especially in the U.S mainland sample. Similarly, the mean age of the two groups differed. In addition, the St. Croix sample reveled a complicated combination of poor and wealthier middle-class individuals compared to the U.S. residents. Because previous research has demonstrated that demographic variables collectively impact perceptions of police, the differences that we reported between the two cultures may have resulted from the differences in demographic factors rather than place of residence.

Future researchers may want to focus more exclusively on ethnic groups within each culture. In addition, our study asked very restricted questions about citizens' personal interactions with police officers. Future researchers may want to solicit information about a wider range of police-citizen interactions, such as routine traffic stops. In addition, because crime impacts economic issues, future researchers could investigate how police perceptions relate to political viewpoints across these two cultures.

In general, our study revealed that United States mainland adults had more negative interactions but more positive perceptions of police officers than did St. Croix residents. Despite these differences in perceptions, adults from both cultures reported very similar reactions to a criminal narrative. In other words, in the abstract, mainland adults favor the police, but in a specific situation, this difference disappeared. We also found that Caucasians held more positive perceptions of police officers than did African-Americans, and adults high in symbolic racism held more positive perceptions than did adults low in symbolic racism. These findings match the police-citizen tensions commonly reported in today's society. This study provides a rare comparison of two cultures and, like other research studies, reveals the complexity behind perceptions of police officers.

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A NON-SELECTIVE SEROTONIN ANTAGONIST PROMOTES RAPID HABITUATION IN THE TERRESTRIAL HERMIT CRAB

KIRANDEEP SUMRA AND W. DAVID STAHLMAN

UNIVERSITY OF CALIFORNIA, LOS ANGELES

Abstract - Research has indicated that serotonin (5-HT) modulates non-associative learning in a variety of invertebrate species. Recent work has demonstrated that the terrestrial hermit crab is a suitable animal model for non-associative learning phenomena, including habituation, sensitization, and dishabituation. We examined the potential role of a non-selective 5-HT antagonist, methysergide, in non-associative learning in the hermit crab. We administered methysergide prior to delivering repeated stimulus presentations of a looming visual predator. We found evidence for more rapid habituation relative to a control condition in which crabs did not receive the drug. These results indicate a role for 5-HT in the defensive behavior of the hermit crab and importantly, suggest a conserved role for 5-HT in modulating basic learning processes in invertebrates.

Keywords: serotonin, methysergide, sensitization, hermit crab, habituation, risk assessment

Non-associative learning represents possibly the most-ubiquitous psychological phenomena in the animal kingdom. The types of non-associative learning most commonly studied include habituation and sensitization. Habituation, defined as a learned reduction in animals' reactivity to repeated stimulus presentation (Groves & Thompson, 1970), has been identified and examined in a wide variety of phylogenetically distant species, from the sea snail *Aplysia* (e.g., Castellucci, Pinsker, Kupfermann, & Kandel, 1970), to the zebrafish (e.g., Wong et al., 2010), to the lab rat (e.g., Davis, 1974), to humans (e.g., Epstein, Rodefer, Wisniewski, & Caggiula, 1992). Sensitization, defined as an increase in general reactivity in response to the presentation(s) of arousing stimuli, has been found to be almost as commonplace (e.g., Brunelli, Castellucci, & Kandel, 1976).

Substantial evidence has accumulated regarding the relevant neurochemical systems that are employed in non-associative learning situations. Prior studies of sensitization in invertebrates have implicated the endogenous neurotransmitter serotonin (5-HT) in non-associative learning in invertebrate species [e.g., in *Aplysia* (e.g., Barbas, DesGroseillers, Castelluci, Carew, & Marinesco, 2003; Brunelli et al., 1976; Glanzman et al., 1989), in the crab *Chasmagnathus granulatus* (Aggio, Rakitin, & Maldonado, 1996), and in the leech *Hirudo medicinalis* (Burrell & Sahley, 2005; Burrell, Sahley, & Muller, 2001; Traina, Ristori, Brunelli, & Scuri, 2013; Zaccardi, Traina, Cataldo, & Brunelli, 2004)]. Administration of 5-HT has been found to facilitate the effects of presynaptic transmission (Chitwood, Li, & Glanzman, 2001) resulting in an increased likelihood of sensitization. For example, Aggio et al. found that when the crab *Chasmagnathus granulatus* is presented with a visual stimulus of a passing shadow, it responds with a running reaction (an escape response); this response is enhanced with administration of exogenous 5-HT. Exogenous serotonin has also been found to delay the habituation of a leech's swimming response in response to a tactile stimulus (Alkatout, Marvin, & Crisp, 2007). Studies indicate that the administration of drugs that block 5-HT (i.e., antagonists) have the opposite sort of effect, that of increasing the rate of habituation. For example, Zaccardi et al. (2004) found that methysergide, a non-selective 5-HT antagonist, impaired the onset of sensitization of swim induction in leeches and thus promoted the onset of habituation (see also; Crisp & Burrell, 2009; Zaccardi, Mozzachiodi, Traina, Brunelli, & Scuri, 2012).

There have been a number of studies performed in recent years investigating simple learning in terrestrial hermit crabs (Chan, Giraldo-Perez, Smith, & Blumstein,

2010a; Chan et al., 2010b; Stahlman, Chan, Blumstein, Fast, & Blaisdell, 2011; Tran, 2015) and characterizing the environmental and individual factors that govern their defensive behavior. However, there is a lack of experimental work detailing neurochemical functions in these animals in the production of learned behavior[1]. If the role of serotonin in non-associative learning is conserved across species, we should expect that the manipulation of 5-HT receptors would modulate non-associative learning in hermit crabs in much the same way as in other invertebrates. We conducted a single experiment designed to examine the effects of a non-selective serotonin antagonist, methysergide, on the hermit crab's withdrawal response. The experiment described in this paper investigated whether the serotonergic system is critical for the expression of simple learning in hermit crabs in a threatening situation.

Auditory stimuli of high intensity have been shown to be sensitizing in a number of species (e.g., Davis, 1974; Stahlman et al., 2011). In keeping with prior literature, we predicted that administration of a non-selective serotonin antagonist (methysergide) would mitigate the impacts of irrelevant acoustic stimulus intensity, such that animals would be less likely to sensitize in the experimental drug condition relative to a control (non-drug) condition. We administered to the crabs a non-selective serotonin antagonist (methysergide). We then presented the crabs with acoustic stimuli of either a mild or intense nature, followed by repeated presentations of a looming visual predator (Chan et al., 2010b; Stahlman et al., 2011). We predicted that methysergide-treated crabs would habituate more quickly to repeated presentation of the simulated predator in comparison with controls.

Method

Subjects

Twenty-nine experimentally naïve hermit crabs (*Coenobita clypeatus*) with shell aperture lengths of approximately 2- to 5-cm were acquired from a local vendor. The ages and sexes of the crabs were unknown. Prior to the study, and between experimental sessions, crabs were housed in groups of six in four clear plastic tubs (approximately 50 cm x 25 cm x 25 cm) where they were provided with one pellet of Tetrafauna™ Hermit Crab Cakes per crab, and two ceramic water dishes for salt water (1%) and regular drinking water, respectively. The home tubs also contained wet synthetic sponges, coconut fiber substrate (Zoo Med Eco Earth™), and plastic covers. Temperatures were maintained at approximately 24°C. The humidity levels in the tubs were maintained between 60-80%. Each subject was identified by one of six colors of non-toxic nail enamel that was painted on its largest claw (cheliped) and on the animal's shell. Prior to the experiment, and between experimental sessions, the crabs were maintained on a 14 hr/10 hr day-night schedule. Experimental sessions were conducted during the animals' light cycle.

Apparatus

The experiment was conducted in a 61 cm x 61 cm x 43 cm cubicle. The experimental setup consisted of two speakers on either side of a 17-inch LCD computer monitor. This monitor was used to display a visual stimulus of a wingspread hawk (see Figure 1).

The image began as a single pixel at the top-center of the screen, and then descended and expanded at a steady rate for 15-s until the stimulus reached the bottom of the screen at a maximum size of screen width of 33 cm (cf. Stahlman et al., 2011). The two speakers

Figure 1. An image of the simulated visual predator at its maximum size. The presentation of the image began as a single pixel at the top of the screen, at which point it descended and increased in size at a linear rate for the duration of the trial.

[1] There is a body of biological literature investigating the structure of the serotonergic systems of crabs and closely related invertebrates. Such investigations have found, for example, that 5-HT is a powerful modulator of cardiac function (e.g., Kobayashi, 1987; Yazawa & Kuwasawa, 1992).

were placed 45 cm apart from one another and could broadcast white noise at either a fixed 74 dB sound pressure level (SPL) or fixed 95 dB SPL as measured by a sound meter (RadioShack™ CAT 33-2055) at the location of the subject.

The crab restraint device (CRD) was constructed of a solid wood base (26 cm x 28 cm) and an adjustable C-clamp that was located at the front of the monitor. The C-clamp was attached to two levers that allowed for forward, backward, and vertical movement in order to accommodate different shell sizes and to maintain a consistent distance of 20 cm between each subject and the monitor. We positioned a Logitech C200 webcam so that it was parallel to the shell's long axis, and thus provided the experimenter with a side view of the animal. From this vantage point, the captured image consisted of a small portion of the animal's shell, its legs (only when the animal had emerged), and a royal blue background. A second camera was positioned at an elevated position behind the crab and provided a simultaneous view of both the crab and the monitor. See Figure 2 for a schematic of the experimental apparatus.

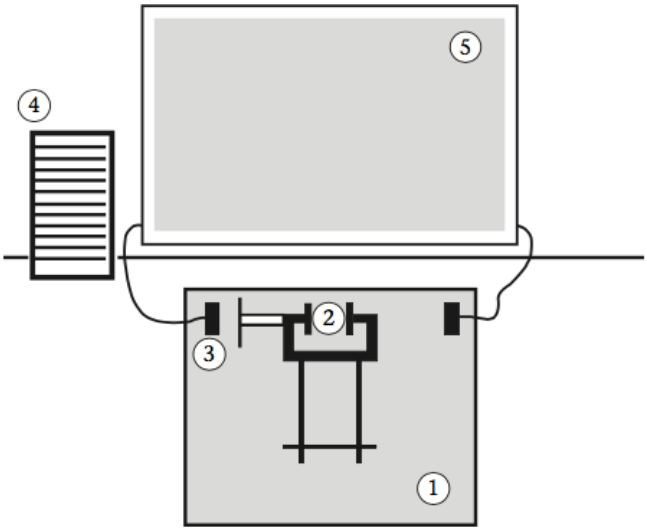

Figure 2. Schematic of the experimental apparatus. (1) indicates the wooden base of the CRD; (2) indicates the crab's position; (3) indicates photobeam detectors; (4) indicates the speaker through which the auditory stimulus was played; (5) indicates the computer screen upon which the visual predator was presented. Redrawn from Chan et al. (2010).

Procedure

Fifty-five hours prior to the experimental session, all crabs were randomly assigned to small tubs (20 cm x 19 cm x 8 cm) where they were pair-housed. Each tub contained coconut-fiber substrate (identical type as the home tub) and a wet sponge. Animals were not provided with food or water.

Two solutions were prepared at the beginning of the day of the experiment. A drug solution was prepared by dissolving 10 mg of methysergide maleate (Sigma-Aldrich, St. Louis, MO) in 45 mL of a saline vehicle. This resulted in a 250 μM solution. The 0.9% vehicle was prepared by dissolving a single sodium chloride tablet (Bioultra, Sigma Aldrich) in 1000 mL of water. Then, 1.5 mL of the drug solution and 1.5 mL of store-bought pineapple juice were pipetted into small circular bowls (approximately 2 cm tall and 6 cm in diameter) and mixed thoroughly with 0.5 g of Tetrafauna Hermit Crab Meal. The same procedure was followed when making the vehicle mixture (1.5 mL of vehicle, 1.5 mL pineapple juice, 0.5 g of Hermit Crab Meal). All crabs were transferred to new tubs (identical to tubs used in the deprivation stage) so that they could be individually housed for the duration of the experiment. Each tub then had the bowl of the appropriate mixture (i.e., either Methysergide or Vehicle) placed within it. The crabs had access to the drug cocktails for four hours; two hours prior to the inception of experimental procedures, each crab was individually picked up and manually placed into the mixture[2].

After four hours, the drug mixtures were removed from the tubs and experimental sessions commenced. All experimental sessions were conducted under dim incandescent lighting. An individual crab was put onto the back of its shell (i.e., aperture facing up) into the CRD (Chan et al., 2010b). A trial began when the crab emerged from its shell; this was defined to be the point when the crab's eyes were visible in the side camera and the crab was freely moving. Each trial began with a 30-s delay, followed by a single presentation of either the soft or loud (depending on experimental condition) 50-s auditory stimulus. This was followed by the first presentation of the predator stimulus. The crab received repeated presentations of the predator until a trial occurred in which the crab did not withdraw during the visual stimulus. Presentations of all experimental stimuli were controlled by a Dell™ Inspiron 580 desktop

[2]We included this step in our design out of an abundance of caution to ensure that all animals came into contact with the mixture. This appears now to be largely unnecessary, as we observed that all animals ambulated to the food dish and consumed the mash during the pre-session period.

computer with code written in Visual Basic 6.0. Experimental procedures took place over two daily sessions that were separated by a 96-hr delay.

We utilized a 2x2 mixed factorial design in this experiment. The first factor, manipulated between-subjects, was Drug; there were two levels for this variable, Methysergide (MET) and Vehicle (VEH). The second manipulation was a within-subjects manipulation and was reflective of the intensity of the auditory stimulus, which had two levels: Soft (74 dB) and Loud (95 dB; see Stahlman et al., 2011). Presentation of acoustic stimuli was counterbalanced across crabs, as was the order in which MET and VEH animals were tested.

We had two dependent variables (DVs). The first DV was the number of trials it took for the hermit crabs to fail to respond to the presentation of a simulated visual predator. It was indicated by the first trial during which a crab failed to withdraw into its shell in response to the visual stimulus. In this experiment, an anti-predator withdrawal response was defined as the visible withdrawal of the crab's body into its shell (i.e., pulling the body inward towards the shell aperture) during the presentation of the simulated predator. For example, if a hermit crab performed the anti-predator withdrawal response three times (once during each of three different presentations of the visual stimulus), and failed to retract during the fourth stimulus presentation, the crab's score during this session was recorded as 4. Our second DV was the logarithm of the time (in seconds) that crabs remained withdrawn in their shells before subsequent trials. Log latencies were used here to normalize scores prior to analysis, as the distribution of scores was positively skewed.

Two crabs (one from each group) underwent molting either during or between experimental sessions, at which point they were eliminated from experimental procedures and their data removed from the analysis. Additionally, four animals (two from each group) failed to emerge from their shells for any trials during each of the two experimental sessions, and thus were removed from data analysis. Thus, analyses were conducted with 12 animals in Group MET and 11 in Group VEH. Data were analyzed using a two-way mixed analysis of variance (ANOVA) with Drug as a between-subjects factor, Auditory as a within-subjects factor, and Crab as a random factor.

Trials to Habituate

The ANOVA revealed a main effect for drug, $F(1, 21.78)=6.35$, $p=0.02$, with MET crabs habituating in significantly fewer trials (mean = 3.45) than VEH animals (mean = 6.22; see Fig. 3). There was not a significant effect of auditory stimulus, $F(1, 20.98) = 1.52$, p = 0.23, nor was there a significant Drug x Auditory interaction, $F(1, 20.98)=1.24$, p = 0.277.

These data indicate that methysergide administration increased the rate of habituation. This is consistent with prior findings that the administration of serotonin antagonists reduces sensitization and promotes habituation in invertebrate species.

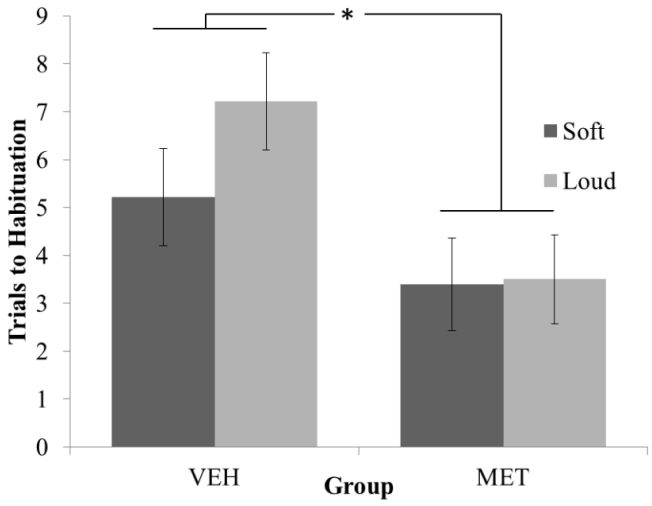

Figure 3. Mean trials to habituation as a function of drug group and auditory stimulus intensity. The asterisk indicates a significant difference. Error bars indicate standard errors of the mean.

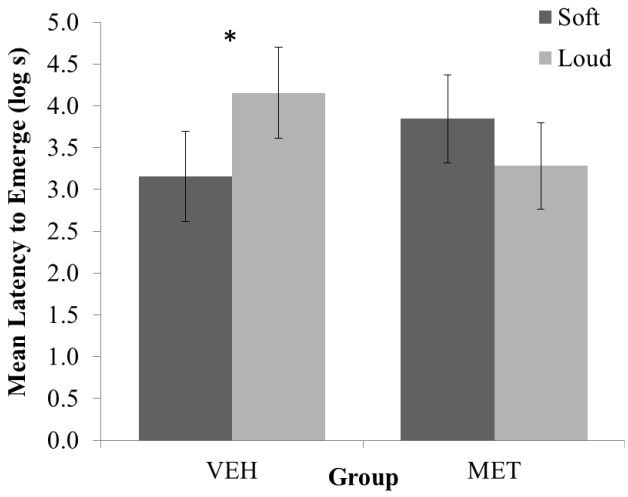

Figure 4. Mean log latency for crabs to emerge as a function of drug group and auditory stimulus intensity. The asterisk indicates a significant difference. Error bars indicate standard errors of the mean.

Latency to Emerge

A two-way mixed ANOVA found no significant effect of drug, $F(1, 21.01) = 0.02$, $p = 0.90$, and no significant effect of auditory stimulus, $F(1, 20.18) = 0.90$, $p = 0.35$. Critically, however, the analysis did reveal a

significant Drug x Acoustic interaction, $F(1, 20.18) = 11.52$, $p = 0.003$ (see Fig. 3). Planned comparisons found that VEH animals exhibited significantly greater latencies (mean = 4.16) to emerge during Loud sessions as compared to Soft sessions (mean = 3.16). No other comparisons were significantly different (all ps > 0.09).

Discussion

It may seem odd that methysergide appears to have differential effects dependent on the nature of the dependent variable measured. Administration of methysergide resulted in crabs requiring fewer trials to lose the reflexive response to the appearance of the visual predator than in comparison to those crabs that received no drug; however, no such difference manifested when the groups' latencies to emerge were compared. However, this seeming conundrum may be explicable in terms of the chemical systems engaged during each of these patterns – the withdrawal reflex may be mediated by 5-HT to a greater extent than the behavior of emergence. Should this be true, we might expect that administration of a 5-HT antagonist would have a larger effect on the production of withdrawal than on emergence. This is not to say that 5-HT likely plays no role in emergence behavior. We did observe that a significant difference in the animals' emergence response (i.e., longer latencies to emerge when less habituated) was eliminated with the administration of methysergide. To our knowledge, no one has expressly investigated this possibility – the neural architecture of *Coenobita* and its relation to behavior is still not well understood (Harzsch & Hansson, 2008). However, the study of other invertebrate species lends clues regarding differential innervation of muscles that underlie rapid escape as compared to other behaviors [e.g., as in crayfish (Edwards, Heitler, & Krasne, 1999) and squid (Otis & Gilly, 1990)]. Crayfish, for example, engage in escape behaviors of at least two fundamental types: LG (rapid) and non-G (slower) escape responses. Neurochemical modulation of these two classes of response appears to be independent from one another, and 5-HT may be differentially involved in each (Edwards et al., 1999; Krasne, Shamsian, & Kulkarni, 1997). Further investigation using both biological and behavioral assays will be required in order to discover whether such a distinction underlies the withdrawal and emergence behaviors of hermit crabs. Researchers should also consider additional kinds of serotonergic manipulations. The administration of a 5-HT agonist, for example, may result in increased sensitization relative to a vehicle control (see, e.g., Aggio et al, 1996; Traina et al., 2013).

Overall, we obtained strong evidence in support of our central hypothesis. Hermit crabs were quicker to habituate to the repeated presentation of a simulated visual predator when they were under the influence of a 5-HT antagonist, methysergide. Additionally, control crabs were comparatively slow to re-emerge from their shells when sensitized via the presentation of a loud auditory stimulus before trials of the visual predator; this difference was eliminated with administration of methysergide. These results constitute evidence for the role of a serotonergic system in the production of visually mediated withdrawal behavior in terrestrial hermit crabs, and suggests the conservation of a neurobiological mechanism by which a ubiquitous non-associative learning phenomenon is instantiated.

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Author Note

K. Sumra's present affiliation: College of Medicine, University of Arizona, AZ, U.S.A.
W. D. Stahlman's present affiliation: Department of Psychological Science, University of Mary Washington, VA, U.S.A.
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THEORETICAL EXPLANATIONS FOR VACCINE REFUSAL

MADELINE CARSON

BENEDICTINE COLLEGE

The subject of vaccine refusal has risen to popular attention as of late. It is no longer merely an issue that is discussed by the medical community or between patients and physicians. Rather, it has become an issue that is hotly debated on social networking sites, in mainstream media, and upon which everyone seems to have an opinion. The purpose of this paper is to take an initial step toward understanding the motivation, method, and mechanisms at work in parental vaccine refusal, as doing so will be a crucial step on the road to more effective public health education in this area. One important event that brought this issue to light was a recent outbreak of measles which has been linked to the Disneyland amusement park in California. According to the Center for Disease Control (2015a), there were 117 measles cases spanning several states from January 1, 2015 to May 1, 2015, all of which were linked to Disneyland. As a result, the CDC issued a health advisory on January 23 to inform public health departments and healthcare facilities regarding this multi-state outbreak and to provide guidance for healthcare providers nationwide (CDC, 2015b). The very first recommendation was that parents ensure that their children are up-to-date on the MMR vaccine. The CDC, however, was not the only one to respond to this event. The outbreak turned a public ear to a debate that has been going on for years.

Despite a plethora of scientific evidence showing that childhood vaccination has been one of the most successful medical interventions of all time (CDC, 2014), many parents have reservations with respect to vaccinating their children, and, often, these doubts and scruples lead to vaccine refusal (Freed, Clark, Butchart, Singer, & Davis, 2010). These parents often cite fears of vaccine-induced autism or other alleged dangers as their reason for refusal. In a 2009 survey conducted by Freed et al., 25% of parents believed that vaccines caused autism. It is not surprising that the medical community has responded with an effort to increase education and inform these parents of the body of research disproving any link between autism and vaccines. These attempts, however, seem to be largely in vain.

In a crucial study, Nyhan, Reifler, Richey, and Freed (2014) examined the persistence of misinformation as it relates to vaccine misconceptions. The study was conducted in two waves. In the first, respondents completed a measure of pre-intervention attitudes on health and vaccines. In the second wave of the study, the same respondents were randomly assigned to receive one of four pro-vaccination messages or a control message. These four messages included: an autism correction message that presented scientific information from the CDC debunking the alleged link between vaccines and autism; a description of the disease risks and adverse events that are associated with measles, mumps, and rubella; a disease narrative that used a CDC account of a mother describing her child's hospitalization with measles; and a collection of images which presented pictures of a child with each preventable disease.

None of these messages was successful at increasing parental intent to vaccinate. In fact, although the autism correction message successfully reduced the idea that vaccines cause autism, it still somehow resulted in a *decrease* in the intent to vaccinate among parents who were less likely to vaccinate their children in the first place. Thus, despite succeeding in reducing specific misconceptions about vaccines, none of the attempted interventions significantly increased participants' intentions to engage in the recommended behavior.

This study bears significant weight with respect to vaccine education and public health because it shows how wrong these kinds of interventions can potentially go. However, finding an explanation for this parental reluctance is no simple task. It is probable that the cognitive processes at work, both in the initial vaccine refusal and in the subsequent persistence of misinformation, are complex and cannot be explained by one theory alone. The purpose of this review is to elucidate the various theoretical explanations which may play a role in the layered and multi-faceted issue of vaccine refusal. These explanations include fear appeals, psychological reactance theory, and belief perseverance effect. Nyhan et al.'s (2014) study provides a convenient jumping-off point for this discussion. This paper will

especially focus on that study's findings with respect to autism, as the failure of their persuasive message was clearest in this area. First the paper will describe three social psychological theories and provide some relevant research to establish them. Then, these theories will be related to vaccine refusal and their application discussed.

Fear Appeals

Fear appeals may play a large role in planting the initial seed of doubt in a parent's mind regarding the safety of vaccines. Essentially, a fear appeal is a message that employs fear of potential negative consequences as a motivator for the recipient to engage in a recommended behavior (Witte & Allen, 2000). This recommended response is promoted as a way to avoid the negative consequences. One of the foremost models for fear appeals is the Extended Parallel Process Model (EPPM). According to the EPPM, as described by Witte and Allen (2000), exposure to a fear appeal triggers two appraisals of the message, which result in one of three outcomes.

In the first appraisal, individuals determine the severity of the threat. The more individuals believe they are susceptible to a serious threat, the more motivated they are to begin the second appraisal, which is an evaluation of the efficacy of the recommended response. If the threat is perceived as irrelevant or insignificant (i.e., low perceived threat), then there is no motivation to process the message further, and people will simply ignore the fear appeal. In contrast, when a threat is portrayed as and believed to be serious and relevant, individuals become scared. Their fear motivates them to take some sort of action that will reduce their fear.

Perceived efficacy (composed of both self-efficacy and response efficacy) determines whether people will become motivated to control the danger of the threat or control their fear about the threat. If they are motivated to remove the threat, they will typically engage in the recommended behavior. However, if they are motivated to control their fear due to a belief that the response would be futile (low self-efficacy and response efficacy), they will attempt to remove their fear through denial or reactance.

One of the primary areas in which fear appeal research has been conducted is public health advertising, especially with regard to smoking (e.g. see Smith & Stutts, 2003; Watson, Pettingale, & Goldstein, 1983; Timmers, & van der Wijst, 2007; Leshner, Vultee, Bolls, & Moore, 2010; Rogers, & Deckner, 1975.) In an important experiment, Wright, French, Weinman, and Marteau (2006) studied the influence of perceived susceptibility and self-efficacy in smoking cessation. The EPPM considers perceived susceptibility to form part of a threat appraisal, postulating that the impact of threat appraisal on intentions for risk-reducing behavior is moderated by the results of a coping appraisal. Coping appraisal considers the recommended behavior (here, smoking cessation; potentially, vaccination) in terms of its perceived effectiveness at reducing the threat (response efficacy) and one's perceived ability to perform it (self-efficacy). They found that smokers who received information that they had a high genetic risk for heart disease had higher intentions to quit than others. However, stronger intentions to quit were also related to higher levels of self-efficacy, irrespective of the type of risk information the smokers received. In fact, self-efficacy was more strongly associated with intentions to quit than was risk group. Overall, the results of this study show that perceived self-efficacy is perhaps the most potent variable in predicting intentions to quit smoking following a fear appeal.

Research by Thompson, Barnett, and Pearce (2009) corroborates this finding with similar results regarding the paramount importance of perceived self-efficacy for smoking cessation following a fear appeal. These findings may also shed light on the vaccine discussion. If perceived self-efficacy does, in fact, play such a significant role in motivating individuals to take a course of action, this is valuable information to apply to the way that vaccines are promoted. Perhaps emphasizing parental efficacy would increase the success of vaccine promotion. It also provides an important direction for research, as it is crucial to learn whether these findings are generalizable to other applications of fear appeals, or if they are specific to smoking cessation.

Researchers have also studied the effectiveness of fear appeals for changing alcohol-related behaviors. Moscato et al. (2001) studied the use of fear appeal messages as a potential method of managing the problem of binge drinking on college campuses. In this study, the fear appeal intervention involved threat of arrest for underage drinking and intoxication. Researchers measured a myriad of outcome variables. Responses from their survey showed that both perceived efficacy and perceived threat were significantly and negatively correlated with students' drinking behavior. Results demonstrated that those who heard the message were more likely to attend alcohol-free events and to have less self-reported drinking behavior. These results corroborate the research done on anti-smoking fear appeals, continuing to find efficacy and vulnerability especially relevant variables. These findings should inform medical professionals and public health services on how to best recommend vaccines. For example, it may be important to emphasize the susceptibility of children to vaccine-preventable diseases, and demonstrate the

parents' ability to protect their children from this threat (self-efficacy).

In another study, Slavin, Batrouney, and Murphy (2007) examined the use of fear appeals with HIV-relevant messages directed at members of a gay community. The authors noted that, within this community, there had been a recent shift toward nonchalance in the face of HIV because it is treatable. This study, in particular may be especially relevant to vaccine-refusal, as parents may believe vaccine-preventable illnesses are less serious because most of them are treatable. In this study, therefore, the researchers used fear-based messages focusing on the discomfort and negative experiences associated with anti-retroviral treatment (ART) of HIV, rather than HIV itself. It may be similarly possible to use fear appeals to recommend vaccination by highlighting the painful and difficult treatment processes for vaccine-preventable diseases as well as their potentially very severe complications and effects. For example, pertussis, commonly known as whooping cough, often causes respiratory failure in young children, which may mean prolonged hospitalization on a ventilator (CDC 2015d). Similarly, for every 1,000 children who contract measles, one or two will die from it; one in 1,000 will have encephalitis which may cause brain damage; and one in 20 will be hospitalized for pneumonia (CDC, 2015e). Highlighting these adverse effects of even treatable diseases may be a useful tactic for the promotion of child vaccination.

The HIV-negative participants in this study, who were the target audience, knew very little about ART or its side-effects; thus the posters were reviewed with a general lack of understanding in this group. They actively sought to identify a different target audience than themselves, manifesting a strong tendency to engage in 'othering.' The researchers concluded that the data supported the view that the message recipients will actively discount or distance themselves from fear appeals that they do not perceive to be immediately relevant. Finally, the researchers cautioned against the use of a fear-based campaign, stating that it will not work to reduce HIV transmission and could, conceivably, increase the problem (Slavin et al., 2007). This provides a cautionary caveat to the use of fear appeals and shows the necessity of making the threat comprehensible and relevant to the target audience; something that should not be ignored if they are to be directed toward the promotion of vaccination.

For vaccine refusal, all the studies outlined above are very relevant in that they collectively demonstrate, through the examination of fear appeals with respect to cigarettes, alcohol, and HIV, the importance of self-efficacy and perceived vulnerability to a threat. The decrease in parental intent to vaccinate, therefore, could possibly result from a lack of perceived self-efficacy when it comes to protecting their children from harm. It is possible that the reason the autism fear appeal has led to vaccine-refusal is that parents perceive greater vulnerability to autism than to the diseases that vaccines are designed to prevent. More parents of infants today have probably had a personal encounter with autism than with measles, mumps or rubella. For this reason, they might decide to protect their children against what they perceive to be the more probable threat. The irony of this decision is, of course, that the reason that measles, mumps, and rubella are perceived as a less immediate danger is because vaccines have been so effective at preventing their occurrence. Though it offers some initial understanding of the motivation behind this action, the fear-appeal explanation for parental decrease in intent to vaccinate is limited and hypothetical. In many ways, psychological reactance theory is more qualified to explain this phenomenon.

Psychological Reactance Theory

Fear appeals, while definitely a relevant theoretical perspective, do not provide a comprehensive explanation for the mechanisms contributing to vaccine refusal. Importantly, they do not explain why a "boomerang" or "backfire" effect might occur. This is the effect whereby message recipients not only do not perform the recommended behavior, but indeed actively respond in opposition to it. Psychological reactance theory provides a better explanation for this response, which was evident in Nyhan et al.'s (2014) finding that the parents who initially held the most negative beliefs about vaccines reacted to the persuasive messages by becoming more committed to their intention to not vaccinate their children. Reactance theory fundamentally holds that people become motivationally aroused by a threat to or elimination of a behavioral freedom (Brehm, 1989). This impels the individual to restore the particular freedom that was threatened or taken away.

In a general sense, Brehm's theory of psychological reactance hypothesizes that there may be two behavioral displays of reactance: actual attempts to restore the freedom, and increased perceived attractiveness of the lost or threatened option. Brehm also argues that specific losses might be especially motivating because they are perceived to foreshadow a threat to other, related freedoms. The research on psychological reactance has demonstrated that a lost choice alternative tends to become more attractive, a forced attitudinal position tends to become less

attractive, and a social influence attempt can easily boomerang like it did in Nyhan et al.'s (2014) study (Brehm, 1989). It is possible that parents see vaccination as something that might be forced on their child without their consent or involvement in the decision, and this may make them more likely to not only cling to, but manifest their parental autonomy by refusing to vaccinate their child.

Baer, Hinkle, Smith, and Fenton (1980) proposed an interpretation of psychological reactance, called "impression management," that focuses on self-presentation. It asserts that people are less concerned with the actual loss of a specific behavioral freedom than they are with maintaining the outward appearance of being free. For vaccine refusal, this theory would imply that the parents who have been outspoken in their condemnation or skepticism regarding vaccines will be very likely to tenaciously maintain those positions in order not to publicly backtrack or admit that they could have been mistaken. Participants in Baer et al.'s (1980) study experienced a threat to their personal freedom to hold a particular attitude. Prior to the threat, some participants were able to exercise their freedom either publicly or privately while others were not given the opportunity to do so. Afterwards, the participants' post-communication attitude toward the experimental issue was assessed. The researchers had correctly anticipated that participants, motivated by concerns for impression management, would only exhibit attitude change indicative of reactance when the communicator was aware of their post-communication attitude, and then only if they had not previously exercised their freedom by publicly defending an opposing viewpoint.

Thus, Baer et al. (1980) showed that the effects of psychological reactance may well be the result of a preoccupation with appearances. Those individuals who react obstinately in opposition to challengers might do so as much to "save face" as to protect their specific freedom. In relation to Nyhan's (2014) study, this information may indicate that those individuals who exhibited the "boomerang" effect may have been reacting so strongly against vaccines, in spite of the convincing data before them, because they did not want to contradict their own previous statements and were thus unwilling to change their stated opinion. So, psychological reactance theory may explain the incidence of vaccine refusal when parents react to persuasive methods in the opposite of the desired direction, particularly when those parents have made their anti-vaccination attitudes known to others.

It is probable that physicians and health care professionals usually do not provide arguments urging vaccination until after parents have expressed their opposition. Understanding psychological reactance may lead to a more preventative route by not giving parents the chance to state their opinion until they have been properly informed. Nonetheless, more research should be done to determine effective persuasive methods for combatting or circumventing psychological reactance effects.

Belief Perseverence

Psychological reactance adds something to the puzzle of vaccine refusal, but focuses primarily on those reactions which are typified by their extremity; parents who *decrease* intent to vaccinate after persuasive techniques are attempted. This is the fundamental difference between reactance and perseverance. Reactance indicates the presence of some active response to a perceived threat. Belief perseverance, on the other hand, focuses on some held conviction which merely persists despite arguments to the contrary. Those arguments do not strengthen the conviction; in fact, they do not change it at all. The belief perseverance effect, first appearing in research in 1975, is an effect which has been robustly shown throughout many studies in which individuals cling to beliefs even when the evidential basis for those beliefs is completely refuted (Nestler, 2010).

The best-supported explanation for this effect is that of an "attributional framework." According to this theory, individuals construct a causal explanation to account for the observed event which subsequently becomes independent of the original evidential basis. Therefore, though the evidence they initially used to make the attribution is removed, the conclusion itself remains (Nestler, 2010). Regarding vaccines, this applies to the many cases where parents simply remain skeptical about vaccines even after receiving proof that their specific doubts are evidentially unfounded. A study by Anderson, Lepper, and Ross (1980) demonstrates that when participants are told that two variables are related, and then learn that the opposite is true, they tend to cling to the initial belief.

This study was one of the earliest experiments concerning the perseverance of beliefs in the face of total evidential discrediting. Anderson et al. (1980) researched the mechanisms that might underlie belief perseverance, hypothesizing that, even after the initial evidential basis for their beliefs has been completely refuted, participants would fail to make appropriate revisions in those beliefs. They also expected that the provision of a causal explanation would enhance the perseverance of a theory after its discrediting.

Results of this experiment showed that participants who were initially exposed to data indicative of a positive relationship between risk-taking and success

as a firefighter continued to believe that a positive relationship existed, even after a debriefing process that stated that their information they had read was entirely fictitious, whereas participants in the negative relationship condition continued to believe in a negative relationship. Thus, the initial case study evidence exerted a strong lingering effect on participants' theories about the true relationship between the two variables. Anderson et al. (1980) also performed a second experiment which showed that having students generate an explanation for the relationship made the initial belief even more resistant to change.

These findings pose a daunting challenge for vaccine promotion because they indicate that even fraudulent claims about vaccine unsafety can become independent of the argument provided and can be very difficult to dispel, even with concrete evidence. Andrew Wakefield's untrue report linking vaccines to autism is a perfect example of this effect. It proves how very difficult it is to undo the damage of such ill-founded claims. Moreover, it is not practically possible to control what misinformation parents are exposed to regarding vaccines, so it is unlikely that public health officials will be able to prevent belief perseverance by preventing the generation of untrue vaccination beliefs in the first place.

Nestler (2010) introduced a possible means of combatting belief perseverance. He tested the hypothesis that individuals who are asked to generate an explanation for some reported outcome and experience this task as difficult may therefore think that there is no good explanation for the outcome. The results supported his hypotheses, showing that when participants were given the difficult task of generating multiple reasons for why two variables might be related, they became less convinced that the variables really were related to each other. That is to say, their initial beliefs about the variables did not persevere.

When it comes to vaccines, this information might suggest that, to individuals who find rising autism rates difficult to explain, the simple explanation that "vaccines cause autism" may be so appealing to them merely due to its perceived clarity and simplicity. This is what is known as the "overkill backfire effect." Oftentimes, the myth is more cognitively attractive than the truth due to its simplicity (Lewandowsky, Ecker, Seifert, Schwarz, & Cook, 2012.) Therefore, physicians and public health officials should focus on presenting vaccine information in a way that is more cognitively simple and attractive to the non-medical layperson. While it may seem that more information and data supporting an argument will make it more effective, overly technical and intellectual arguments may actually turn recipients off to the message. Another approach that these results suggest is to challenge the cognitively simple myth and make it more complex. Pressing parents for *how* vaccines actually cause autism or asking for more than one reason that vaccines are dangerous may make the task more difficult and the explanation seem less plausible, just as in Nestler's (2010) study.

Discussion

Vaccine refusal is an important public health concern. Understanding its roots may influence how physicians and public health officials proceed in terms of policy, promotion, and education on the subject of vaccines. To this end, it is important that research continues to expand our understanding of parental concern, reasoning, and persistence in vaccine refusal. It is probable that one theory will be inadequate to explain the totality of this complex phenomenon. Therefore, this paper examines various aspects of three different theories which, together, might be able to expand our understanding on this matter. It is probable that fear appeals, psychological reactance, and belief perseverance all play a part in explaining vaccine refusal, while none is sufficient to do so alone.

The application of fear appeal research to vaccine refusal is a good place to begin the search for an explanation. It is clear that an element of fear plays a role in parents' decision-making in this realm. The research done on fear appeals may have several implications for this issue. First, they raise the question of susceptibility. It is possible that parents who refuse vaccinations perceive their children to be more susceptible to autism, for example, which they have probably witnessed, than to something like measles, which they are unlikely to have seen firsthand. Additionally, the results illustrate the importance of perceived self-efficacy. It may be the case that parents do not believe vaccines to be an effective preventative measure against illness, or perhaps they do not perceive themselves to be capable of standing between their child and serious illness. This latter argument, however, seems difficult to maintain if the recommended behavior is as simple as saying "yes" to vaccinating.

One way to explain possible low efficacy in parents is the presence of conflicting fear appeals regarding vaccines. Vaccine anxiety is unique in that it involves two directly opposed fear appeals. One appeal promotes vaccination for the prevention of disease, while the other appeal promotes anti-vaccination to prevent adverse effects of the vaccine itself. In the face of these two very frightening prospects, parents may well feel impotent to prevent some negative outcome for their child. It may seem to be a lose-lose situation, and they

may, consequently, employ defense mechanisms, such as denial, to reduce fear. Strangely, this denial may work in favor of either appeal. Parents may deny that vaccine-preventable illnesses are really a threat and therefore *not vaccinate*, or they may deny the contradictory threat that vaccines cause autism or have other adverse side effects and therefore *vaccinate*. The question that public health officials need to be asking, if they intend to use fear appeals as a method of vaccine promotion, is how to make the pro-vaccine fear appeal more effective than the anti-vaccine fear appeal.

While fear appeal research certainly begins to provide a theoretical explanation for parental vaccine refusal, its explanation is not comprehensive. One aspect, in particular, that it seems ill-equipped to explain is the "backfire" or "boomerang" effect that is sometimes reported. The theory of psychological reactance, however, can begin to fill in this gap. This theory is relevant to the vaccine movement in light of the tendency for some parents to persist in their vaccine refusal even after acknowledging that the facts do not support their stated reasons for such refusal (Nyhan et al., 2014).

The theory of psychological reactance suggests that parents might react so strongly against vaccine use because they perceive it as a sort of mandate, to which they feel pressured to submit. This may cause parents to become more behaviorally inclined to exercise their freedom by rejecting the recommended vaccine, especially as more states begin to mandate vaccination of school children (National Vaccine Information Center, 2015). According to the impression management interpretation of psychological reactance, it is possible that it is primarily those parents who have been most vocal in the anti-vaccine campaign who are likely to ignore evidential arguments. They might be acting out of a certain self-presentation concern that motivates their determination.

Still, psychological reactance theory does not provide a comprehensive understanding of vaccine refusal. The persistence of a belief which has been disproved remains unexplained. Psychological reactance focuses especially on the instances and circumstances which strengthen an individual's view to make him or her react in such a way as to defend a particular freedom. With regard to vaccines, the theory of belief perseverance might be better suited to explain the peculiar difficulty experienced in the dispelling of vaccine myths. It is possible that parents hear some initial claim about the dangers of vaccines and their consequences, but that they subsequently form their own causal explanation for this negative effect. Thus, even if the initial claim is refuted (e.g. vaccines do not cause autism), their initial attribution remains (vaccines are harmful), as it has become independent of its initial evidential support.

It is worth noting that parental fears regarding autism, while not evidentially supported in relation to vaccines, are, to a certain degree, understandable. The prevalence of autism in the United States has increased dramatically in recent years (CDC, 2015c). While this trend may be largely explained by a recent broadening of the diagnostic criteria for an autism spectrum disorder, it does not explain the entirety of the increase (First, 2008). Although empirically unfounded, parents' attribution for this rise in autism to vaccine-use may provide them with relief and a sense of control. It is probable that the fear of giving up their rationalization and *not* knowing how to protect their child from this growing threat contributes to their sense of fear and their persistence in maintaining this belief. For this reason, when debunking vaccine myths, a great deal of delicacy is needed.

Vaccine refusal may be perceived by many in the medical community as absurd, but it is worth recognizing that the motivation behind the action is well-intentioned. According to Lewandowsky, Ecker, Seifert, Schwarz, and Cook (2012), if information is presented in a way that threatens an identity or worldview, there is risk of a "worldview backfire effect" in which the initially-held beliefs are strengthened. Therefore, it may be effective to lead into the correction of vaccine misinformation by affirming the parent's desire to protect the safety of their children, thereby endorsing the values of the audience.

This paper is a merely first step on a long road to better public health education, but even so, the research presented here supports an approach that: affirms the beliefs and values of the audience (parents), increases their self-efficacy, makes them feel personally vulnerable to the threat of vaccine-preventable diseases, reduces the potency of conflicting fear appeals, does not pose a threat to their specific freedom, and is cognitively simple and understandable. But the effectiveness and specific incorporation of these strategies has yet to be tested.

Future research should be done to elaborate on the role each of these theories has in vaccine refusal. Fear appeal research should manipulate opposing fear appeals both for and against vaccination to determine how to best increase a useful fear appeal and decrease the potency of an interfering fear appeal.

Future research in the area of psychological reactance with vaccine refusal should seek to assess the effectiveness of various techniques for reducing the "boomerang effect" experienced by Nyhan et al. (2014). Research on this subject may need to study both how to present child vaccinations in a way that does not pose a threat to parental freedom, and how to convince parents

who have been vocal in their opposition of vaccines and may subsequently stick to their arguments for impression management reasons.

Finally, future directions for belief perseverance research ought to focus on presenting the positive outcomes of vaccines in a cognitively simple and therefore attractive way, while corrupting the cognitive simplicity of the myth. It would be worthwhile to test whether a difficult task (e.g. providing 10 reasons why vaccines have adverse effects) might reduce fallback on the "easy" explanation provided by the myth. It would also be valuable to have vaccine refusers provide counter-explanations, that is, hypothetical reasons describing why vaccines are not dangerous, as a potential method of debiasing belief perseverance

Conclusion

The vaccine refusal trend has been discussed at length. Physicians discuss parents' obstinacy, members of the anti-vaccination movement dispute medical knowledge, and parents worry for the safety of their children. However, despite all this conversation, very little empirical research has been done to understand where this fear comes from; why parents sometimes react the opposite from how they are expected to; or why the belief carries on, even when its support has been refuted. This paper has aimed to identify some of the reasons behind these phenomena. Nonetheless, empirical research testing these theories specifically as they apply to vaccine refusal is crucial in order to come to a more complete understanding of how to most effectively educate the public and correctly dispel misinformation.

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