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The Impacts of Researcher Attire on Participant Performance in Psychological Experiments

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THE IMPACTS OF RESEARCHER ATTIRE ON PARTICIPANT PERFORMANCE IN PSYCHOLOGICAL EXPERIMENTS

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Abstract

While authority has been extensively studied by psychological researchers, there is a clear gap in the literature examining how authority works within research itself. Specifically, the current study examines how the attire of researchers affects participants' obedience to their directives and participant perceptions of the researcher. The final sample of participants in the current study included 49 people, ages 17-54 years. Participants were shown a video of a researcher explaining the current study, with the researcher wearing either casual clothing, formal wear, or a white lab coat uniform. The researcher asked participants to give maximum effort on a series of tracing tasks that followed. The final tracing task was impossible, and the amount of time participants persevered on the task was operationalized as a proxy for obedience. Participants were then asked to rate the researcher on several measures, including scales for competence and warmth. The only significant finding in the current study was a correlation between competence and warmth ratings. Strengths and weaknesses of the current study are discussed, including the researchers' concerns with the use of perseverance as a proxy for obedience, with some of the other stimuli in the study, and with online research in general. Avenues for future research into authority in psychological research is also discussed.

Keywords: obedience to authority, attire, competence, warmth, research methods

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Authority is ubiquitous throughout societies. Be it in education, work, social situations, or families, the dynamics of authority guide and shape behaviour. Authority has been extensively studied in psychological experiments, resulting in the discovery of numerous factors that impact perceptions of authority, including attire (Bickman, 1974; Bushman, 1988). However, there is a dearth of research closely examining the dynamics of obedience to authority within psychological studies themselves. Even though psychologists have worked on authority for decades, little self-reflection on authority has taken place. As a result, the current study focuses on how attire can affect participant perceptions of psychological researchers as authority figures.

Obedience to authority varies from similar constructs like compliance and conformity, as there are key differences in the nature of how individuals are being told what to do and who or what is telling them. Obedience occurs when participants are directly commanded to perform an action or task, rather than simply being asked to, as is the case with compliance (Aronson et al., 2016). Normative pressures can make it highly difficult for one to disobey such direct commands, creating an additional lever of power and persuasion not present in compliance (Aronson et al., 2016). Additionally, the fact that the person giving said commands is generally perceived as an expert or an authority lends itself to informational social influence. When people are in novel situations, they often look to their situation to provide cues for how to act. When people conform, this information is usually taken from watching others and emulating them (Deutsch & Gerard, 1955). For obedience to authority, however, the perceived authority's guidance and expertise are the information used to guide actions in novel situations (Miller et al., 1995; Aronson et al., 2016). Perceptions of individuals as authority figures have been shown to be affected by their attire, as exemplified with a pair of "parking meter" studies. In these studies, a confederate asks passersby to refill a stranger's parking meter that is about to expire, with

participants' compliance to the demand measuring obedience to authority. The only aspect that differs among the various conditions of the study is the attire of the confederate. The concept was pioneered by Bickman (1974), who dressed the confederate as a civilian, a milkman, or a guard. In the initial study, outfit congruence to that of a parking attendant was the key determinant of authority, with higher compliance found when the confederate was dressed as a guard than in the other two conditions (Bickman, 1974).

Bushman (1988) expanded on Bickman's (1974) study with some key changes. For one, Bushman used a female confederate rather than a male one, to determine if the effects of attire also extended to perceptions of women as authority figures. The conditions were also somewhat different in Bushman's study, with the three different types of attire based on Bushman's predictions concerning participants' derivations of authority: casual attire, or "no authority"; formal attire, or "status authority"; and a parking attendant uniform, or "role authority". Strongest compliance was found in the "role authority" condition, with the weakest compliance found in the "no authority" condition (Bushman, 1988). Additionally, Bushman asked participants afterwards why they refilled the meter, finding notable differences in their responses. Participants in the "no authority" condition were more likely to chalk up their compliance to their own altruism, while participants in the "role authority" condition often displayed unquestioned obedience, simply saying that they refilled the meter because they were told to (Bushman, 1988).

These findings of the impacts of attire for women are reflected in several additional studies on attire. Indeed, the effects of attire appear to be especially strong for perceptions of women as authority figures. When comparing perceptions of police officers as authority figures, the effects of a uniform and a hat were stronger for female officers than male officers (Volpp &

Lennon, 1988). The effects of attire also extend beyond simple perceptions of authority; women who dress “in code” in the workplace and at school are perceived more positively (Gurung et al., 2018). These effects also extend directly into academia, with female thesis students being perceived as more professional and competent when wearing professional attire (Fasoli et al., 2018).

In addition to the especially strong impacts of attire for female authority figures, there are also effects that are more widespread and less gender-based. While the uniform had stronger impacts than formal attire in Bushman’s (1988) study, that difference may have been specific to the role of a parking attendant. The key factor is likely not the uniform itself, but the congruence of attire that was integral to Bickman’s (1974) study. When a uniform exists for a profession, for example dental tunics for dentists, wearing said uniform elicits the highest compliance and preference (Furnham et al., 2013). However, if there is no uniform, such as for a lawyer, formal attire elicits comparable compliance and preference (Furnham et al., 2013). While formal attire may simply act as a uniform for professionals in occupations where formal attire is common, formal attire outside of any specific profession can also result in higher compliance and obedience: in one study, when asked by someone if they could borrow a dime, participants were likelier to give them the dime if they were dressed formally, rather than casually (Kleinke, 1977).

The current study seeks to examine how these various mechanisms of attire and authority affect obedience to and perceptions of researchers by participants. While there is little existing research on how researchers themselves are perceived, there are some studies in the general field of academia that may be insightful. Fasoli et al.’s (2018) aforementioned study about female thesis students displayed how formal attire can convey professionalism and competence. Given prior research, one would expect this to be the case for researchers as well, since there is no strict

uniform for psychological researchers. However, there are some complicating factors when studying psychological researchers. Milgram's (1963) infamous study on obedience to authority had the researcher wear a lab coat to convey authority. Additionally, even into the 21st century, white lab coats tend to broadly convey authority and trustworthiness (Brase & Richmond, 2004). As a result, even though there is no specific uniform for researchers, it is possible that a white lab coat can be perceived as the proper uniform for psychological researchers.

Another complicating factor of the current study is determining how to measure obedience to a psychological researcher. Provided that a participant has fully consented to the study and that they are not made uncomfortable by the experiment, it is unlikely that they will say no to a command from the researcher. As a result, a different operationalization must be used that is not based solely around a command. One possible proxy measure could be perseverance. Previous studies have shown that experimental manipulations can increase and decrease perseverance; perseverance levels are able to be increased with growth-based mindset interventions that reinforce the flexibility of intelligence (Bettinger et al., 2018), but they can also be depleted by having to withstand temptation (Baumeister et al., 1998). The current study uses an impossible tracing task similar to the one used by Baumeister et al. (1998) to measure perseverance as a proxy measure for obedience. If the researcher's command in the current study asks for maximum effort on a similar impossible tracing task for the sake of the experiment, obedience to stronger perceived authority based on attire could create more volition to persevere on the impossible task.

Additionally, the current study aims to obtain some insight into the processes that govern the effects of attire on authority. Specifically, looking at warmth and competence, the two universal dimensions of social cognition, could provide some key insights. Warmth and

competence are considered universal dimensions of social cognition because of their ability to govern universal positive and negative reactions and perceptions (Fiske et al., 2007). If someone is perceived as warm and competent, they elicit universally positive reactions and perceptions, while if they are perceived as cold and incompetent, they elicit universally negative reactions and perceptions. Warmth ratings generally represent perceptions of intent and motives, such as friendliness, trustworthiness, and helpfulness, while competence ratings focus on perceptions of ability, including intelligence and efficacy (Fiske et al., 2007). Since attire can affect ratings of warmth (Aruguete et al., 2017; Furnham et al., 2013) and competence (Furnham et al., 2013; Gurung et al., 2018) in both academic and non-academic areas, one can reasonably assume that it will colour researcher perceptions in some way.

The effects of attire on perceptions of warmth and competence appear to be dependent on numerous other factors. Continuing the comparison of dentists and lawyers mentioned briefly above, Furnham et al. (2013) found that for dentists, who have a common uniform, that uniform seems to convey more friendliness than both casual and formal attire, with formal attire conveying the lowest levels of warmth. However, for lawyers, multiple formal outfits convey more warmth than casual attire (Furnham et al., 2013). These findings imply that while formal attire may elicit the perception of competence regardless of profession, formal attire only elicits the perception of warmth when congruent with certain professions or roles. Additionally, warmth and competence ratings are often subject to stereotypes of race and gender, resulting in prejudiced judgements; for example, women are often judged as being less competent than men, and Asian Americans are often viewed as being more cold than white Americans (Cuddy et al., 2011). Biases based solely on these broad category memberships have been shown to influence warmth and competence ratings when encountering new people (Brown et al., 2018). These

biases also affect how attire influences warmth and competence ratings; men are generally rated as friendlier than women regardless of attire (Furnham et al., 2013), and the effects of attire on trustworthiness appears to be moderated by race, with casual attire preferred for white professors and formal attire preferred for Black professors (Aruguete et al., 2017).

Overall, the current study examines how researcher attire affects perseverance on an impossible task, with perseverance acting as a proxy measure for obedience. The researcher, who was portrayed by a female confederate so that the current study is in line with the wealth of existing research on the effects of attire on female authority figures, wore either casual wear, formal attire, or a white lab coat. Participants were instructed by the researcher to complete a series of tracing tasks with maximal effort, the final one of which, without them knowing, was impossible. After participants gave up on the final task, they were asked to explain the reasons for their perseverance and rated the researcher on warmth and competence. Additionally, the current study examines how much the white lab coat is perceived as the congruent uniform of a psychological researcher.

There are four main hypotheses for the current study. The first (H1) concerns the effect of attire on obedience, with the researchers predicting that participants in the formal wear and uniform conditions will persist longer on the impossible tracing task than those in the casual wear condition, as a result of stronger obedience to the command to give maximal effort. The second (H2) concerns participants' explanations for their obedience: it is predicted that participants in the formal wear and uniform conditions will display more obedience in their explanations than those in the casual wear condition. The third hypothesis (H3) concerns competence ratings, as it is expected that participants in the formal and uniform conditions will rate the researcher as more competent than those in the casual attire condition, in line with

previous research (Furnham et al., 2013). For the first three hypotheses, the researchers predicted that both formal attire and the white lab coat will be perceived as the congruent attire for psychological researchers, and that this will govern participants' views and behaviours. The fourth and final hypothesis (H4) concerns warmth. Given the unclear and sometimes contradictory effects of attire on warmth ratings (Furnham et al., 2013; Aruguete et al., 2017), this final hypothesis is non-directional, predicting that attire will have some kind of impact on warmth perceptions and ratings.

Method

Participants

Participants were recruited from undergraduate students at Huron University College and from the friends and family of the researchers. Participants were compensated for their participation with the chance to enter a draw to win one of three $50 Amazon.ca gift certificates. Some undergraduate students were also given extra credits by their professors in an undergraduate Psychology course for their participation in the current study.

The study had a total of 97 participants (27 men, 55 women, 15 other or did not report). Of the 97 participants, 24 were excluded as they did not watch the video which contained the experimental manipulation. The responses of an additional 13 participants were excluded from most analyses as they did not complete the three tracing tasks. A further 11 participants were also excluded from most analyses because they answered that they had successfully completed the impossible task. The final sample consisted of 49 participants (18 men, 29 women, 2 other or did not report; 69.4% White, 16.3% Chinese, 8.2% South Asian, 4.1% Black, 4.1% Latin American, 2.0% Arab, 2.0% Indigenous, 2.0% Japanese, 6.1% other; mean age = 21.41 years, age range = 17-54 years, *SD* = 8.48).

Materials & Procedure

Participants were invited to participate in a study where they had to complete tracing tasks on a sheet of paper and answer some survey questions. The study was implemented using an online survey on Qualtrics. After reading the letter of information and providing informed consent, participants answered some basic demographic questions of age, gender, ethnicity, and current year of study in university (if applicable), and confirmed that they had the necessary materials for the study and that their audio was working. Participants were then asked to watch a video explaining the experiment. At this point, participants were then randomly assigned to one of three levels of the independent variable based on which video was presented. All three videos featured the same confederate acting as the researcher; the confederate was a white woman in her 20s. For participants in the 'casual wear' condition, the confederate explaining the study was wearing a plain dark-coloured t-shirt. For participants in the 'formal wear' condition, the confederate was wearing a light grey blazer with a black sweater underneath. Finally, for participants in the 'uniform' condition, the confederate was wearing a white lab coat with a black shirt underneath. The conditions in the study are based off those from Bickman's (1988) study, with the lab coat replacing the parking attendant uniform in the 'uniform' condition to reflect Brase & Richmond (2004)'s research on the white lab coat effect. The only difference between the three videos was the outfit of the confederate; the script, tone of voice, setting, and film quality of each of the videos was as close to identical as possible.

In the videos, the confederate explained to the participants that they would be performing tracing tasks where they must trace the shape shown on the screen on a piece of paper in front of them without lifting their pen or crossing any previously drawn lines. Participants were also told to take any breaks before or after the shape is on their screen so that the length of time recorded

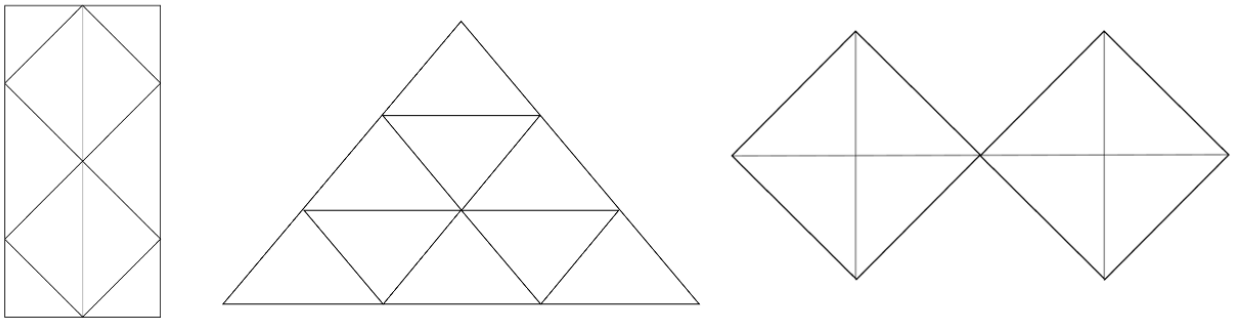
to complete each task is accurate to the amount of time they spent on it, and to indicate on the survey whether they have successfully completed a task or if they feel they are unable to complete the shape and would like to move forward. The confederate also said the following sentence: “It is very important for our experiment that you give maximum effort when completing the tracing tasks.” This sentence was the command from the authority figure that was predicted to affect participants’ obedience, perseverance, and performance.

After the video, participants were then presented with three shapes in a row from Glass & Singer (1972). These shapes can be seen on the next page (Figure 1). The first two shapes are soluble, while the third and final shape is not. The time spent by each participant on each shape was recorded. Once participants indicated that they were unable to complete the third and final shape, they were directed to a prompt explaining that the third shape was impossible to complete and asking them why they persevered for as long as they did on the shape. This was a free response question for participants to write whatever they wish. This question was partially adapted from Bushman’s (1988) parking meter study; in that study, Bushman asked participants why they refilled the parking meter and categorized their responses based on the amounts of altruism and obedience in their responses. Responses to the question in the current study were rated by the researchers on a five-point Likert scale ranging from 1 (no obedience) to 5 (total obedience) based on the degree to which obedience to the command of the researcher was present in participants’ responses. The free response measure later categorized by the researchers, rather than presenting participants with the scale itself, was used to avoid priming participants to think specifically about obedience when responding.

Participants were then asked to rate the researcher they saw in the videos on a series of traits. These traits are from Aragonés et al.’s (2015) scales for warmth and competence.

Figure 1

Tracking Tasks Used in the Current Study



Note. The first two shapes from left are soluble, while the third and final shape is impossible to complete according to the rules of the current study.

Aragonés et al. (2015) identified four adjectives for each of warmth and competence that provide high validity and reliability at multiple levels of closeness and relatedness. The four adjectives for warmth are ‘kind’, ‘pleasant’, ‘friendly’, and ‘warm’, while the four adjectives for competence are ‘competent’, ‘effective’, ‘skilled’, and ‘intelligent’. In the current study, the participants were presented with these eight adjectives in a random order and asked to rate the researcher on a five-point Likert rating scale for each adjective (as with Aragones et al., 2015), ranging from 1 (i.e., not kind at all) to 5 (i.e., very kind), with higher numbers indicating more of each adjective. The researchers then calculated the average of each participant’s scores for the warmth and competence measures to create a singular warmth rating and a singular competence rating for each participant. Aragones et al. (2015)’s samples of the scales for ratings of individual people had Cronbach’s alphas of .81 and .72 for warmth and competence respectively.

After completing the warmth and competence measures, participants were then asked to indicate what the researcher was wearing in the video. This measure was included to examine to what degree participants were conscious of their recall of the clothing worn by the confederate and also served as a manipulation check. Similar to the question about why participants spent as much time as they did on the impossible task, this measure was also a free response measure, to avoid priming participants’ recall of what clothes were worn in the video they watched. While this measure is not included in the primary hypotheses of the study, responses were categorized by the researchers on a five-point Likert rating scale ranging from 1 (no recall) to 5 (detailed recall) for any exploratory analyses. Finally, participants indicated how familiar they were with the type of tracing task used in the study using a five-point Likert rating scale ranging from 1 (not familiar at all) to 5 (extremely familiar). After completion of the survey, participants were fully debriefed on the full and true purpose of the study.

Results

Preliminary Analyses

Familiarity. We first examined whether participants were familiar with the type of tracing tasks used in the study. A one-way ANOVA was conducted to determine whether familiarity with the tracing tasks used in the study differed between the three conditions (casual wear vs. formal wear vs. uniform) in the study. There were no significant differences found for familiarity with the tracing tasks based on the clothing of the researcher, $F(2, 46) = 1.70$, $p = .194$, $\eta^2 = .069$. Participants' familiarity with the tasks did not differ between the groups where the researcher was wearing casual wear ($M = 2.43$, $SD = .94$), formal wear ($M = 1.94$, $SD = .99$), or the white lab coat uniform ($M = 1.84$, $SD = .90$).

Recall of researcher's clothing. We then examined how much accuracy and detail participants had when recalling the researcher's clothing in the video. A one-way ANOVA was conducted for the analysis, which helped determine whether participants paid attention to attire to the same degree between the three conditions (casual wear vs. formal wear vs. uniform) in the study. There were no significant differences found for clothing recall based on the clothing of the researcher, $F(2, 46) = 2.51$, $p = .093$, $\eta^2 = .098$. Participants' recall of the researcher's clothing did not differ based on whether the researcher was wearing casual wear ($M = 2.71$, $SD = 1.38$), formal wear ($M = 2.69$, $SD = 1.70$), or the white lab coat uniform ($M = 3.63$, $SD = 1.17$).

Primary Analyses

To test our hypotheses, one-way ANOVAs were conducted to determine whether the clothing of the researcher in the video seen by participants (casual wear vs. formal wear vs. uniform) affected a number of dependent variables.

Time spent on impossible task. First, we examined whether the clothing of the researcher affected the amount of time that participants spent on the impossible task. There were no significant effects found for time spent on the impossible task based on the clothing of the researcher, $F(2, 46) = .46$, $p = .633$, $\eta^2 = .020$. The amount of time that participants spent on the impossible task did not differ based on whether the researcher was wearing casual wear (M = 3.05, SD = 3.22), formal wear (M = 3.61, SD = 4.73), or the white lab coat uniform (M = 4.45, SD = 4.40).[1]

Competence of researcher.[2] Next, we examined whether the clothing of the researcher affected participants' competence ratings of the researcher. There were no significant effects found for competence ratings based on the clothing of the researcher, $F(2, 44) = .27$, $p = .762$, $\eta^2 = .012$. Participants' competence ratings of the researcher did not differ based on whether the researcher was wearing casual wear (M = 4.21, SD = .71), formal wear (M = 4.30, SD = .77), or the white lab coat uniform (M = 4.40, SD = .58).

Warmth of researcher. We then examined whether the clothing of the researcher affected participants' warmth ratings of the researcher. There were no significant effects found for warmth ratings based on the clothing of the researcher, $F(2, 46) = .29$, $p = .749$, $\eta^2 = .013$.

[1] A second ANOVA was also run as an exploratory analysis, using the factor of additional time that participants spent on the third shape compared to the average time they spent per possible shape. In others, we examined the extent to which participants spent more time on the insolvable task than the solvable task. No significant effect was observed, $F(2, 46) = .38$, $p = .685$, $\eta^2 = .016$.

[2] Two participants did not complete the intelligence question on the competence measure; as such, all results involving competence use a sample consisting of 47 participants.

Participants' warmth ratings of the researcher did not differ based on whether the researcher was wearing casual wear (M = 4.61, SD = .54), formal wear (M = 4.63, SD = .48), or the white lab coat uniform (M = 4.72, SD = .43).

Reason for perseverance. While a fourth ANOVA was initially planned to determine whether the clothing of the researcher in the video affected how much participants mentioned obedience in their explanations for time they spent on the impossible task, only two participants mentioned or even implied the effects of obedience, so the planned analysis could not be conducted. As a result, the researchers categorized these explanations by a few major themes to determine what the most salient reasons were. Of the participants in the study, 28.6% persevered for as long as they did to try out different strategies, reporting along the lines that they were "missing something". A further 26.5% kept trying because they genuinely thought that the shape was possible to complete. Other commonly cited reasons were participants' success on the first two shapes (20.4%) and personal desires and drives to succeed (14.3%).

Other Exploratory Analyses

Participants' progress on the survey was utilized as an alternate exploratory measure for obedience.[3] The obedience measured for this variable is independent of the command to give maximum effort on the impossible task or the task itself. It is instead a measure of the extent to which participants obeyed the commands that they were given by the experimenter throughout the experiment differed between the three conditions (casual wear vs. formal wear vs. uniform). In other words, we examined the amount of progress that participants made in the study following the video. A one-way ANOVA was conducted, and participants' progress after

[3] Participants otherwise excluded for not completing the tracing task or for answering that they had successfully completed the impossible task were included in the survey progress measure, with their progress or lack thereof operationalized. Qualtrics survey data was used to confirm how much of the survey participants viewed and completed. This sample consisted of 73 participants.

watching the video was coded by the researchers using an 8-point Likert rating scale, ranging from 1 (did not proceed after watching the video) to 8 (completed the full study). Welch's ANOVA was used to correct for the violation of the assumption of equality of variances (Levene's test was significant, $F(2, 70) = 7.32$, $p = .001$). There were no significant effects found for survey progress based on the clothing of the researcher, $F(2, 44.206) = 1.78$, $p = .180$, $\eta^2 = .048$. Participants' progress on the survey did not differ based on whether the researcher was wearing casual wear ($M = 6.04$, $SD = 3.14$, formal wear ($M = 6.83$, $SD = 2.67$), or the white lab coat uniform ($M = 7.44$, $SD = 1.94$).

Correlations were also examined between all the above-listed dependent variables. Only one significant correlation was found: there was a significant positive relationship between competence and warmth ratings of the researcher, $r(45) = .56$, $p < .001$.

Discussion

The results of the current study showed that participants' perseverance on the impossible task, based on the time spent on the task, did not differ based on the clothing the researcher was wearing during the explanation of the experiment, contradicting the researchers' first hypothesis. Additionally, only a couple of participants indicated that they persisted on the impossible task because of obedience to the researcher, rendering the second hypothesis as null. The researchers' third and fourth hypotheses, regarding competence and warmth respectively, were also not confirmed, as the participants' ratings of the researcher's competence and warmth were not affected by the clothing the researcher was wearing. Additionally, an exploratory analysis using an alternate measure of obedience that operationalized the amount of progress participants made in the survey, by including participants who either did not complete the survey or completed it incorrectly, did not produce any significant results. Running correlations between all the

dependent variables and covariates only produced a very strong relationship between competence ratings and warmth ratings of the researcher, such that the more competence was associated with more warmth.

The positive correlation between warmth and competence is in line with previous literature. Fiske et al. (2007) discussed this "halo effect" originally found by Rosenberg et al. (1968) in the context of warmth and competence. This "halo effect" occurs when people rated positively on one broad trait or dimension tend to also be rated positively on another otherwise unrelated trait. If there were no significant findings, even in places unrelated to the experimental manipulations of the current study, one could assume that sampling error was perhaps the reasoning for the complete lack of significant findings. However, the very strong correlation between warmth and competence implies that the participants in the current study were at least somewhat in line with previous findings, necessitating a closer look at the study design itself.

The first potential problem is in the stimuli themselves. The videos that participants watched were undoubtedly flawed. Since neither of the primary researchers could star in the videos themselves,[4] a confederate was asked to film the videos. The confederate was limited with their camera setup, and thus the videos were not filmed at the most professional angle. Additionally, the videos were shot in portrait mode rather than the more traditionally used landscape mode for videos. Since the formal wear and uniform have tended to elicit preference for professionals in past research (Furnham et al., 2013), the lack of a professionally shot video could have undermined the professionalism that the formal wear or uniform would have otherwise elicited, perhaps resulting in the non-significant results. While neither Bickman (1974) nor Bushman's (1988) research states that the confederates in all of their conditions acted

[4] One of the primary researchers was male, while the current study looked to use a female researcher. The other primary researcher, while female, was also a professor with whom much of the participant pool would have previously been familiar and may have perceived as an authority figure regardless of the clothing worn in the study.

professionally, the concerns with how the quality and setup of the video may have affected perceptions of professionalism in the current study would not have applied to their in-person studies.

Running the current study online posed a number of problems in addition to the researcher stimuli. Previous research using similar tracing tasks to the current study took place in person (Baumeister et al., 1998; Glass & Singer, 1972). As a result, the current study relied on participants to follow the survey's request to be working on the tracing tasks for the entire time they appeared on screen, taking any breaks before or afterwards. Time spent on the impossible task by those who said they could not successfully complete it ranged from .050 minutes to 19.311 minutes. In the current study, there was no way for the researchers to verify that the participants who spent around three seconds on the impossible task even attempted it, or that the participants who spent close to 20 minutes actually spent that time on the task as instructed; it is possible that they also did other things in that time. Additionally, 11 participants said that they successfully completed the impossible task; in an in-person setting, they could have been told that their findings were incorrect and to continue attempting to solve the task, and their data would not need to be excluded. However, there was no way to verify solutions in the current study due to the data collection happening online. The online delivery also had other negative impacts. Over a third of participants gave up on completing the entire survey either while providing demographic information, after watching the video, or while completing the tracing tasks. While this inadvertently allowed the researchers to have an alternate measure of obedience with survey progress, it severely limited the sample size for all other analyses. These limitations of sample size meant that much of the current study was underpowered and therefore more susceptible to Type II error (false negative). Given that one would not expect participants to

withdraw due to distress while providing basic demographic information, watching an explanation, or seeing a shape to trace, it seems that the online nature of the study made it easier for participants to not complete the study simply for their own convenience, rather than for any issue that relates to the study itself.

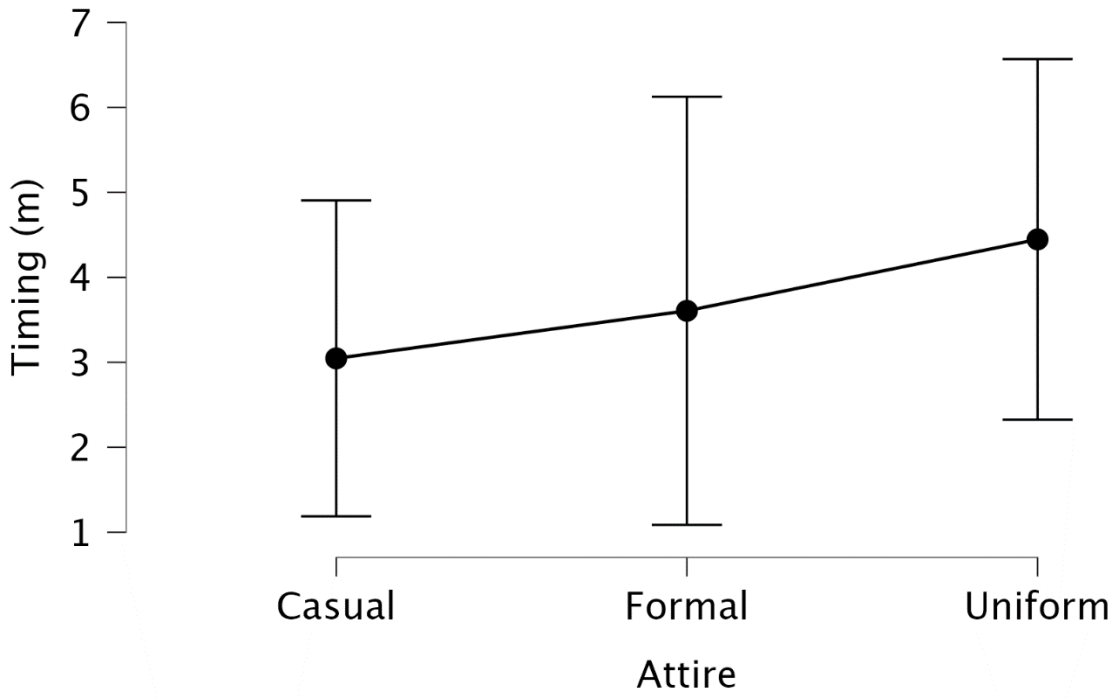
While the issues resulting from running the study online may be responsible for some of the lack of findings, another concern may be with the use of perseverance as a proxy measure for obedience. In Bushman's (1988) study, where obedience is used directly, obedience was mentioned as an explanation for their behaviour by over 60% of those in the status authority (formal wear) and role authority (uniform) conditions. However, in the current study, only two participants mentioned obedience at all, one being from the formal wear condition and one being from the uniform condition, meaning that only 6.3% and 5.3% of the participants in each of those conditions, respectively, mentioned obedience, compared to the 62.5% and 72% found in Bushman's (1988) study. While one could make the argument that the processes may simply be more unconscious due to the more indirect usage of obedience, additional data from the current study implies otherwise. While there was no significant result for any measure of obedience (timing on the impossible tasks, factor of additional time spent on the impossible task, or survey progress), the data for survey progress ($p = .180$, $\eta^2 = .048$) is much closer to significance and has a much bigger effect size than the perseverance measure ($p = .633$, $\eta^2 = .020$), implying that perseverance may not act as a satisfying proxy for obedience.

However, there likely is room for future research in this area, with a few intriguing findings paving the way. As mentioned above, the alternate obedience measure, survey progress, while still not significant, was much stronger than the perseverance measure, implying that

future research should use a measure more directly related to obedience. The uniform condition had higher means than the other two conditions for the perseverance (Figure 2) and survey

Figure 2

Time Spent on the Impossible Task



Note. The graph above compares the means between the three attire conditions for time spent on the impossible task. Error bars account for a 95.0% confidence interval. As mentioned above, the uniform condition has the highest mean of all conditions, but there are no significant differences between the conditions.

progress variables (Figure 3). Additionally, the ANOVA with clothing recall as the dependent variable could have been interpreted as approaching significance, with the mean for the uniform condition close to a full point higher on the rating scale compared to the other two conditions (Figure 4). With this data in mind, it is not beyond reason that a future study that fixed the key flaws of the current study could find an effect for the white lab coat uniform on obedience to researchers. If this is observed in future research, it would imply that the white lab coat is the outfit that participants deem congruent with researchers, rather than formal attire. However, the data in the current study is insufficient to make any conclusions on these points.

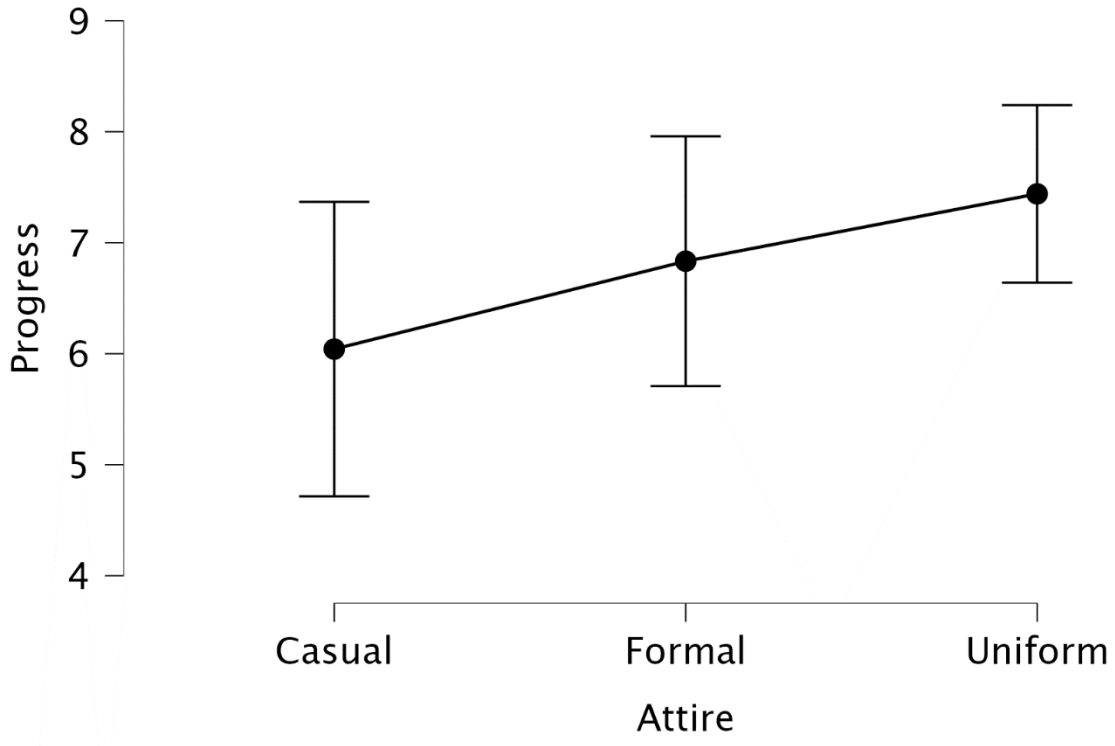
It is difficult to operationalize obedience fully independently in the context of researchers, other than with the less-than-ideal situation of participants not completing a study according to the directions of the researcher. Perseverance may be a more satisfying proxy for motivation, with the researcher's commands possibly interpreted as more motivational than authoritative. As a result, if future studies were to use a perseverance as a proxy, they would need to make the relationship between obedience and perseverance clearer. For example, if obedience was measured by the length of time that participants were, say, holding a heavy object above their heads, the "researcher" would likely need to make commands every 10-20 seconds that perhaps resemble some of the commands[5] from the classic Milgram (1963) obedience study.[6] These commands could also be operationalized, comparing the results of those who had continual commands throughout a perseverance task with those who just had a singular

[5] i.e. "please continue", "please go on", "it is absolutely essential that you continue", etc.

[6] A quick note for this line of future research: given the numerous ethical issues with Milgram's (1963) study, a study using any similar set-up would need to be developed with the well-being of participants in mind. If the study uses using physical tasks such as holding heavy objects, it would be ideal to have physical health experts and ethical representatives on hand who could stop the experiment at any time if necessary, and who could ensure throughout that the participants were being treated with dignity, and that they were not being forced or coerced into doing anything beyond their means and without their full consent. Similar to the hard cut-off at 150 volts in Burger (2009)'s replication of Milgram's (1963) study that was approved by an institutional ethics review board, a limit could be instituted for the amount of time participants perform the task for in the study.

Figure 3

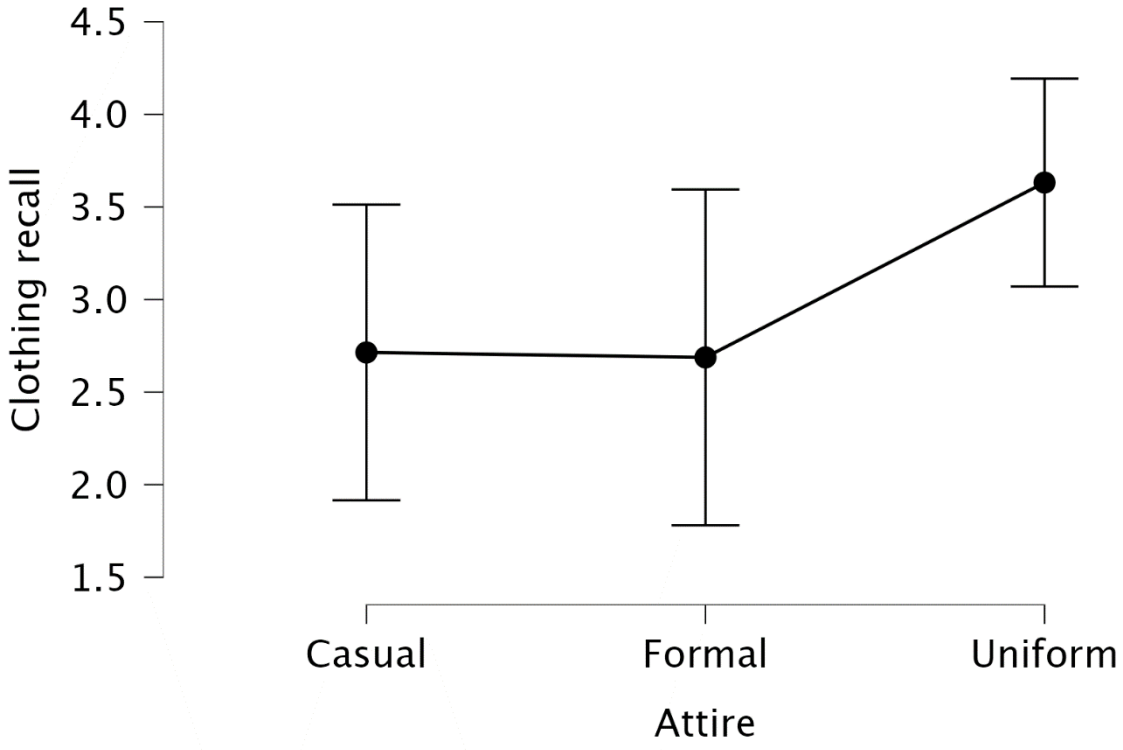
Survey Progress



Note. The graph above compares the means between the three attire conditions for survey. Error bars account for a 95.0% confidence interval. As mentioned above and as with the data in Figure 2, the uniform condition has the highest mean of all conditions, but there are no significant differences between the conditions.

Figure 4

Detail in Recall of the Researcher's Clothing



Note. The graph above compares the means between the three attire conditions for detail recalled of the researcher's clothing. Error bars account for a 95.0% confidence interval. As mentioned above and as with the data in Figures 2 & 3, the uniform condition has the highest mean of all conditions, but there are no significant differences between the conditions.

command to begin said task. Similar to the factor of additional time analysis in the current study, having a first session on a different day where participants complete the task without the experimenter in the room could also provide a baseline to compare results to, in order to avoid sampling errors. While the current study did not create any new findings, it highlighted some of the flaws and difficulties of conducting psychological research online and provided some new avenues for researching the impacts of researcher attire on obedience.

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Appendix I

Analysis of Variance Tables

Table 1

Means, Standard Deviations, and One-Way Analyses of Variance for Possible Confounds, Primary Analyses, and Exploratory Analyses

Variable	Casual Wear		Formal Wear		Uniform		*F*	*df*	*p*	η^2
	M	*SD*	*M*	*SD*	*M*	*SD*				
Familiarity with Tasks	2.43	.94	1.94	.99	1.84	.90	1.70	2, 46	.194	.069
Clothing Recall	2.71	1.38	2.69	1.70	3.63	1.17	2.51	2, 46	.093	.098
Time on Impossible Task	3.05	3.22	3.61	4.73	4.45	4.40	.46	2, 46	.633	.020
Competence	4.21	.71	4.30	.77	4.40	.58	.27	2, 44	.762	.012
Warmth	4.61	.54	4.63	.48	4.72	.43	.29	2, 46	.749	.013
Survey Progress	6.04	3.14	6.83	2.67	7.44	1.94	1.78	2, 44.206	.180	.048

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