Professor: Dr. Bert N. Bakker
Faculty of Social and Behavioural Sciences
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Replication and extension of "*Motivation by Positive or Negative Role Models: Regulatory Focus Determines Who Will Best Inspire Us*" by Lockwood et al. (2002)

Individual Assignment: Registered Report Stage 2

submitted by

Helge Moes
11348801

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Introduction

This paper aimed to replicate study 1 of the experimental research conducted by Lockwood et al. in 2002. In this study, they investigated the impact of goal priming type (promotion or prevention) and of role model type (positive or negative) on motivation ratings. The focus of study 1 was mainly on the interaction effect of both predictors. The authors proposed that motivation was positively affected when the goal priming type and the role model type were aligned. Thus a promotion-primed individual would be better motivated by a positive role model compared to a negative role model (or no role model at all). On the other hand, a prevention-primed individual would have been better motivated by a negative role model compared to a positive role model (or no role model). In summary, they thus propose that goal-congruent role models are better at motivating individuals compared to goal-incongruent role models. In principle they expected a divergent cleaved moderation, they proposed that goal-incongruent role models would even lead to a decrease in motivation. The following hypotheses can be deducted from these propositions:

Hypothesis 1: Promotion-primed participants are more likely to be motivated by the positive model, compared with prevention-primed participants.

Hypothesis 2: Prevention-primed participants are more likely to be motivated by the negative model, compared with promotion-primed participants.

Hypothesis 3: Participants exposed to the goal-congruent role model are more motivated than participants exposed to no role model and goal-incongruent role model.

Hypothesis 4: Participants exposed to the goal-incongruent role model are less motivated than participants exposed to no role model and goal-congruent role model.

The findings of the study mostly confirm these hypotheses. Promotion-primed participants that were exposed to a positive role model experienced significantly more motivation compared to those exposed to a negative role model (and no role model) (H1), whereas prevention-primed participants experienced significantly more motivation when they were exposed to a negative role model instead (H2). Therefore, confirming the third hypothesis as well; exposure to goal-congruent role models led to a significant increase in motivation ratings compared to exposure to incongruent role models (H3). No statistical result was however found for the fourth hypothesis, motivation ratings for those exposed to goal-incongruent role models were lower (compared to congruent and no role models), however, this was not a statistical difference. The overall moderation of congruence was therefore not found to be divergently cleaved, but rather divergently and positively contingent (Appendix A).

The study by Lockwoord et al. (2002) has extended our understanding of the impact of role models on motivation. By integrating the situational factor of which goal(s) one pursues, they further explain when someone was more receptive to a positive role model and when someone was increasingly receptive to a negative role model. Consequently, it added a new perspective to the research on role models (Bakhti et al., 2022; Lee, 2022), highlighting that both positive, as well as negative role models, can boost motivation if it was aligned with one's regulatory goals.

Practically speaking, this had generated a better understanding of role models, role model pursuers and the role modeling process overall, which contributed to developing stronger and more efficient role modeling initiatives (Morgenroth et al., 2015).

Several reasons can be proposed why it is worthwhile to replicate this study after two decades. In general, replication can further contribute to the correctness, accuracy and robustness of findings. Extensive research indicates that (too) often findings of social science experiments can not be replicated (Camerer et al., 2018). This is problematic for theory-building; a theory can only be advanced efficiently when it is built on true findings.

Questions arise if the findings of the study by Lockwood et al. (2002) can be reproduced, given that the sample size is rather low (N = 94). According to our calculations, this would make the study severely underpowered (see power analysis).

In terms of societal relevance, the rise of social media platforms have made it easier to send out and receive one's success and failure, hence making role models implicitly more a part of our daily social comparisons.

In conclusion, the aim is to replicate the findings as described, finding proof for H1, H2 and H3, but not finding significance for H4.

Extension

After having read the theory presented by Lockwood (2002), it presented the effect on a Western population. As stated by Lockwood (2002): "Although individuals in Western culture may tend to be more motivated by positive than negative role models, the kind of role model that they are most receptive to in a given situation may depend on the configuration of goals that are salient in that situation" (p. 862). In this case, the research was limited to western cultures. Lockwood, Marshall and Sadler (2005) researched how cultural background affects the relationship between motivation and role models. They described that western countries are characterized by "individualistic cultures" and eastern countries by "collectivistic cultures" (Lockwood et al., 2005, p. 379). However, they distinguished Western Canadians and Asian Canadians. It was expected that people from "collectivistic cultures" are motivated by negative role models and "individualistic cultures" by positive role models (Lockwood et al., 2005, p. 379).

Hypothesis 5: Participants from 'individualistic cultures' subjected to same-sex positive role model are more motivated compared to participants from 'collectivistic cultures'.

Method

Sample characteristics

The sample was based on a convenience sample, due to a lack of resources and time constraints. The sample was thus not gathered through random sampling. This is common

practice in (survey) experiments since the preference is given to internal validity and not to external validity (Coleman, 2018). In addition, using participants that were readily available could increase the chance of collecting enough participants to generate sufficient power within the limited timespan.

The sample consisted of students. This is partly a consequence of using a convenience sample; the study was employed by students and thus was distributed to networks of students. That the sample consisted of students also serves substantive reasons. Namely, just as the authors of the original study argue, one's motivation was best influenced when one perceives the domain to be relevant (Lockwood & Kunda, 1997). By limiting the sample to students we were in better control to personalize the stimulus material to make it appear relevant. Just as in the original study, this was done by implementing the major of the student in the stimulus. To do so one had to follow a major during data collection, therefore the participant needs to be a student.

There are several predefined criteria on which a participant was excluded from the sample. Those were: the participant did not agree with the terms and conditions of the study, is not 18 years or older, is not enrolled as a student or did not reach the end of the survey (i.e. did not fill in the dependent variable(s)).

In addition, outliers were removed. Outliers are here defined as data points that either exceeded the first quartile minus three times the Interquartile range (lower outer fence: Q1 – (3 * IQR)) or exceeded the third quartile plus three times the Interquartile range (upper outer fence: Q3 + (3 * IQR)). Given that most variables were scaled, it was unlikely that outliers were found.

Outliers in terms of duration were also removed. This means that those that filled in the survey in a short time and those that took long will be excluded from the sample. The participants that filled in the survey in a short time might have not paid full attention, questioning the reliability of their results. The participants that filled in the survey for a long time might have taken a break in between, possibly threatening the internal validity of the study. Outliers in terms of duration were calculated in the same manner as the other outliers.

Failing the manipulation check, the randomisation check (which will be performed on sex and culture) or the ‘external validity check’ (to what extent participants believe the role model descriptions), were not lead to exclusion. Instead, if one of these tests were to fail, the respective testing variable would have been included as a covariate in the eventual model.

Power analysis

To determine the sample size, a power analysis has been conducted using G*Power 3.1.9.7. An ANOVA with fixed effects, special, main effects, and interactions was performed to assess the main effects (the four original hypotheses by Lockwood et al.). That was under the condition that the manipulation check, the randomisation check as well as the 'external validity check' did not fail, otherwise, a covariate was added making it an ANCOVA.

By consulting the literature it was found that the overall effect size of goal priming was small. To be exact a meta-analysis from 2021 found a Cohen's *d* of .45 (Chen et al., 2021). This translated to a Cohen's *f* of .225 ($f = d / 2$, source: Cohen, 2013), the effect size needed in G*Power. Role models also had a small effect (Lawner et al., 2019). A meta-analysis from 2019 found that in lab experiments the Cohen's *d* was on average .20, which translated to a Cohen's *f* of .10. For field experiments this effect was only .04 ($f = .02$). Given that the replicated study was a (online) lab experiment and not a field study this was not accounted for. The lowest expected effect size was thus a Cohen's *f* value of .10 (for role models). Furthermore, the design consists of six groups (3 X 2 design), therefore having a numerator *df* of 2. Lastly, I used a significance value of .05 and I wanted to obtain at least .80 power. By using these criteria G*Power estimated that we needed at least 967 participants.

Experimental procedures

The study had a 2 (goal priming: promotion or prevention) X 3 (model type: positive, negative, or none) between-subjects design.

Pretest: This experiment was conducted online through the survey platform Qualtrics, participants were invited to participate in a study on "Life Transitions". Participants first completed an informed consent process. After consenting, participants were asked several demographics, such as age, gender and culture. Culture was examined based on European, Asian or other cultural background. Lastly a question will be asked in which academic year the participant is. This will be used as a quality check to control if students who are older are also further in their major.

Manipulation 1 - Goal priming: After the demographics are answered, the participant is informed that questions will be asked about which strategies they prefer in order to pursue goals. It will be stated that this information is necessary to assist an undergraduate thesis. Participants will then randomly be assigned to either the promotion-primed or the prevention-prime condition.

The original manipulation from Lockwood et al. (2002, p. 856) has been adopted for this. In the promotion-prime condition, participants will first be asked: “What is a positive academic outcome that you might want to achieve? After which they are asked to describe the strategies they could use: “Which strategy could you use to successfully promote this positive academic outcome?” In the prevention-prime condition, participants will be asked: “What is a negative academic outcome that you might want to avoid?” Also followed by asking to describe their possible strategies: “Which strategies might you use to successfully prevent this negative academic outcome?”

Manipulation 2 - Role model descriptions: Subsequently, participants are informed that the University of Amsterdam has been collecting data on students' experiences during and after university to determine the factors associated with success and failure. Participants will also be informed that researchers are collecting data on students' impressions of how other individuals cope with life transitions as well as their own academic experiences and adjustments. Participants will then be randomly assigned to one of the three experimental groups: the positive role model group, the negative role model group or the control group (no role model). Participants read a self-description, written by a previous study participant, of a graduate from their own academic program (see Appendix B). Participants in the positive role model group will read about the recent graduate's successful life transition, whereas those in the negative role model group will read a rather unsuccessful life transition.

In both role model conditions, the descriptions were individually tailored so that each participant could read a same-gender goal who had just graduated from the same academic major as themselves. This was manipulated by tailoring the name (either a traditional female or male name) and explicitly stating the major in the opening text. Lastly, the no role model control group will not read a description and proceed directly to the next step.

Manipulation Check - Role model adjustment ratings: Lockwood et al. (2002) implemented a role model adjustment rating that consists of five items that were combined into one index. The items were related to how well-adjusted participants view the role model. Lockwood et al. (2002, p. 857) only presented two items of the scale, the latter three items are self-designed. The ratings are on a 9-point scale, with endpoints ranging from 1 (not at all) to 9 (very) (see Appendix B). Those who were in the control group (no role model) will not receive this question.

Post-test - Motivation ratings: Consequently, participants will rate themselves on a set of 14 items (see Appendix B) to measure their motivation in an academic context (Lockwood

et al., 2002, p. 857). Rating will be on an 11-point scale with endpoints labeled 1 (not at all true) and 11 (very true).

Identity of Individualistic and Collectivistic description: Lastly, Participants were asked what they identified with: "With which cultural background do you identify the most?", answering with “Eastern (Asia)”, “Western (European)”, “Both backgrounds”, “Other, namely …”.

Analysis pipeline

First, I excluded the participants on the basis of the predefined exclusion criteria. If a participant disagreed with the terms and conditions, was younger than 18, was not enrolled as a student, did not complete the survey or caused outliers (including in terms of duration), the participant was excluded from the sample.

Next I performed reliability and factor analyses for the role model adjustment, the motivation ratings and the remaining scales, beginning with the reliability analyses. Items were only dropped if the Cronbach's alpha (including all proposed indicators) was below .60 (unacceptable reliability) and dropping an item would lead to a reliability higher than .60.

Secondly, the factor analyses (using principal axis factoring and varimax rotation) were runned. The constructs were only to be split up if the factor analyses propose more than one factor and all the proposed factors were based upon at least three indicators. If less than three indicators loaded on an additional factor(s) then these indicators were dropped.

With the remaining indicators the scales were constructed by taking the average. I checked if both constructs were normally distributed. That was that they were not positively or negatively skewed (the skew has to be between ± -1 and ± +1). Positive skew were resolved by taking the square-root of the scale and negative skew were resolved by taking the square of the scale.

In the original study by Lockwood et al. (2002) it was not explicitly described as a manipulation check. Therefore, after the manipulation check was performed using the role model adjustment ratings, but given that the role models were altered in their degree of success, I supposed that role model adjustment ratings could be interpreted as a direct measure if people indeed perceived one role model as increasingly successful than the other. The manipulation check was tested through an independent t-test, comparing the positive role model with the negative role model. To do so the condition variable needed to be recoded into containing only these two conditions (without the none condition). If the manipulation check is successful the

t-test would be significant, highlighting that those in the positive role model condition rated the role model's adjustment higher than those in the negative role model condition. If the manipulation check failed the role model adjustment ratings, then they were included as a covariate.

For the randomisation checks, these were conducted for both the goal priming manipulation as well as the role model manipulation (including the none condition). The randomisation checks were tested on sex and culture, using a Pearson chi-square test. These needed to be insignificant. If the randomisation checks failed on either one of the manipulations, the respective variable was added as a covariate.

In addition, I performed a quality check to see if the data was logically structured. To check this, I tested if those who were older were also further into their study, compared to those that were younger. A regression analysis was performed to test this (age on academic year).

Lastly if people disbelieved the role model descriptions, the believability question was added as a covariate as well.

Then the main hypotheses were tested. The main model was a two-way ANOVA with interaction effects with the independent variables being goal priming and role model descriptions and the dependent variable being motivation ratings. In the original paper by Lockwood et al. (2002) four additional one way-ANOVA were performed.[1] On the other hand, I performed a Bonferroni post hoc analysis instead.

In order to examine H5, an independent sample t-test was conducted to address the difference between individualistic and collectivistic culture. The variables 'Both Backgrounds' and 'Other' were to be excluded from this study to emphasize on the cultural backgrounds of collectivistic and individualistic.

Results

Exploratory analyses

An alternative model specification to the testing of the hypotheses was implemented. 'Goal Priming' and 'Role Model' variables were recoded into congruence, incongruence and the control group where there was no congruence detected. This was not specified in the stage

[1] 1) Goal-congruent role models versus goal-incongruent role models & controls, 2) goal-congruent role model conditions, 3) goal-incongruent role model conditions and 4) goal-incongruent role models versus controls on motivation ratings.

1 report and the emergence of this alteration made analyzing the results efficient and it corresponds to the original research presented by Lockwood et al. (2002).

Moreover, this alternative specification of recoding these variables were utilized in order to test the congruence of the hypotheses H3 and H4 were implemented as an analysis of variance test that examined whether participants exposed to the goal-congruent role model are more motivated than participants exposed to no role model and goal-incongruent role model and if participants exposed to the goal-incongruent role model are less motivated than participants exposed to no role model and goal-congruent role model.

To assess the representation and significance of incongruence and congruence, an independent sample t-test is conducted to explore the effect of congruence (N = 23) and incongruence (N = 29) on the average motivation. Based on these findings, the incongruent motivation is more represented. The results showed that there were more incongruent (M = 7.147, SD = 1.412) motivations than congruent (M = 6.596, SD = 1.681). Furthermore, the findings also were not significant (F = 1.357, p = .205). Therefore, we do not reject the notion that incongruent motivation is represented more in this case study.

Pre Registered

There were minor details that were altered in the dataset stated in the stage 1 report, namely that the academic year was not always correctly interpreted as the number of years or the annual year was stated, therefore this was altered. Other than that, stage 2 did not have to be updated. Therefore, I have adhered to the registered experimental procedures presented in the analysis pipeline. The findings were generated by participants (N = 142), where N = 78 were considered fit for the study when retrieved in the period from 1 December 2022 to 7 December 2022. The participants were excluded by implementing a filter function of ‘finished’ (if the participant finished the survey) and ‘major’ (if the participant was able to define their major) and ‘age’ (equal or higher than 18). Due to privacy concerns, the names and other confidential information that may affect anonymity has been excluded from the dataset.

Furthermore, the sensitivity power analysis portrays the critical population effect size, thus it signifies the smallest effect size that is relevant for a research. Nevertheless, the minimum effect size was determined based on theoretical consideration. In the case that Lockwood et al. (2002) took participants into account, it will lead to non-significant results at

an expected effect size of 0.2. In Appendix C, the smallest sample size is set at 50, so the total sample (N = 78) is included. The smallest effect size is set to .05. Therefore, if the expected effect size to be 0.2 with a sample size of 78, it cannot be detected, so this shall result in a non-significant outcome.

When conducting the randomization check in cross tabulation, the Pearson chi square of the crosstab displays no significance for sex (p = .392) and cultural background (p = .655). Therefore, the variables of sex and cultural background can be considered fit for this study and this means that these variables were equally randomized over the different conditions.

The manipulation check conducted the independent sample T test of positive and negative role models is normally distributed (N = 52), suggesting that those in the positive role model condition rated the role model's adjustment higher than those in the negative role model condition. The independent sample t test shows that the average adjustment rating is significant (F = .001, p = .001, T = 3.691) with df = 50, a mean difference of 1.642 with CI [.748, 2.536] as well as the average motivation rating is significant (p = .000) with a mean difference 7.08. Therefore, it may not be rejected and equal variances are possible. Therefore, the manipulation check has not failed the role model adjustment ratings, so they did not have to be included as a covariate.

The reliability test on motivation is considered to be successful, since Cronbach's Alpha is .872. This is also the case for the reliability of the scale of adjustment with Cronbach's Alpha is .933. Both these Cronbach' Alpha's were higher than the set .60, therefore these scales are deemed acceptable.

The regression model with the age as the dependent variable and academic year as the independent variable is significant (F = 4.683, p < .035). The regression model can therefore be used to predict frequency of how older the age is, how further they are in their studies. The regression showed that age was (R2 = .074), b* = 22.618, t = 35.486, p < .05 (.000) CI[21.342, 23.893] and academic year, b* = 0.447, t = 2.164, p < .05 (.035) CI [.034, .861]. Therefore, the regression model can be used to predict if older were not specifically further into their study, compared to those that were younger. Consequently, the data was logically structured.

A principal axis factor analysis (PAF) was run containing the 19 items (5 adjustment and 14 motivation) from a uni-dimensional scale with a scree plot, where the point of inflection is 5. Moreover, the varimax type rotation is implemented that shows that all items are positively correlated and the variable "How prosperous do you think the life transition of this person is?" has the strongest association (factor loading is .926). The sample size is

considered adequate based on the factor analysis that exceeds the .60 (KMO and Bartlett's test = .648 | p = .000). Therefore, it appears that motivation and adjustment are measured and that this can be considered a reliable scale with a correlation. There were 5 factors with an item value above 1, the total variance explained states that 77.952% is explained. The constructs were only to be split up if the factor analyses propose more than one factor and all the proposed factors were based upon at least three indicators.

Finally, when respondents (N = 52) were asked if they believed the examples of role models presented in the research, 37 believed the examples and 15 did not. This was taken into the debriefing as a form of manipulation of the subjects.

Post Hoc

In total there were N = 78 respondents, where 41 were valued promotion priming and 37 prevention priming. With regard to role models, there was almost an equal distribution of role model positive (N = 25), role model negative (N = 27) and no role model (N = 26). Furthermore, there were more subjects who were affected by none of the role models (M = 7.443, SD = .321) compared to role models that were present for negative (M = 6.885, SD =) as well as positive (M = 6.859, SD = .326).

A two-factor analysis of variance was carried out to assess whether promotion-primed participants are more likely to be motivated by the positive model, compared with prevention-primed participants and prevention-primed participants are more likely to be motivated by the negative model, compared with promotion-primed participants. The Univariate tests portrays that the effect of goal priming with a positive role model is insignificant (F = .094, p = .760) as well as for negative role models (F = 1.964, p = .165) and none (F = .032, p = .859). Furthermore, the post hoc test indicated that there were no significant differences found between subjects who were affected by positive ($M_{difference}$ = -.0624, p >.05), negative ($M_{difference}$ = -2.30, p >.05) or none ($M_{difference}$ = -2.30, p >.05).

The tests of between-subjects effects also confirms that there is no significance between Goal Priming (F = .259, p = .613), Role Model (F = 1.057, p = .353), Goal Priming * Role Model (F = .893, p = .414), since the results are p > .05. Based on these findings we can reject H1 and H2. When considering the post hoc test of pairwise comparisons; the presence of a positive role model (p = .760), a negative role model (p = .165) and none (p = .859) are all insignificant, since the findings were p > .05. Thus this supports the fact that we can reject both hypotheses.

Hence, the notion that a promotion-primed individual would be better motivated by a positive role model compared to a negative role model (or no role model at all) and a prevention-primed individual would have been better motivated by a negative role model compared to a positive role model (or no role model) cannot be determined. In summary, the replication failed to propose that goal-congruent role models are better at motivating individuals compared to goal-incongruent role models.

In order to test H3 and H4, the total number subjects to test H3 and H4 were N = 78, that were split into congruence (N = 23), incongruence (N = 29) and no congruence (N = 26). An analysis of variance was carried out to address whether participants exposed to the goal-congruent role model are more motivated than participants exposed to no role model and goal-incongruent role model and if participants exposed to the goal-incongruent role model are less motivated than participants exposed to no role model and goal-congruent role model.

The test of between subjects effect portrays no significant findings ($F = 1.734$, $p = .184$), since the significance is $p > .05$. Moreover, the post hoc tests also portrays that the comparison of congruence and incongruence ($p = .655$), incongruence and the control group ($p = 1$) and congruence and the control group ($p = .209$) are insignificant. This was to be expected, since H1 and H2 were also insignificant. Therefore, H3 and H4 can be considered to be rejected as well. This means that there were no findings that support that participants exposed to goal-congruent role model are more motivated than participants exposed to no role model and goal-incongruent role models and that goal-incongruent role model are less motivated than participants exposed to no role model and goal-congruent role model.

In conclusion, the aim was to replicate the findings as described, finding proof for H1, H2 and H3, but not finding significance for H4. Nevertheless, H1, H2 and H3 were insignificant rather than significant and H4 seemed to correspond to the original article by Lockwood et al. (2002), since they also found no significance for participants exposed to the goal-incongruent role model that were less motivated than participants exposed to no role model and goal-congruent role model. Consequently, the replication of the Lockwood et al. (2002) article can be considered as an attempt that raises questions to be discussed and examined further.

Extension

Finally, in the current study there were multiple cultural backgrounds reported: Asian (N = 45), European (N = 28), both backgrounds (N = 7) and other, where American (N = 1),

Latino American (N = 1) were mentioned. However, both backgrounds and others were excluded and the main group was Asian and European (N = 73). Besides these results, an independent sample t-test was conducted to examine whether people from "collectivistic cultures" are on average motivated by negative role models and "individualistic cultures" by positive role models (Lockwood et al., 2005, p. 379). The independent sample t-test (N = 73) contained more 'collectivistic' (M = 7.211, SD = 1.385) than 'individualistic' (M = 6.943, SD = 1.882) cultures. Furthermore, the Levene's test for equality of variances was significant, F= 4.345 , p=.041 (P<.05), CI [-.497, 1.031]. Consequently, the findings can be considered significant and that the average motivation of "collectivistic cultures" are motivated by negative role models and "individualistic cultures" by positive role models, which means that the H5 hypothesis is not rejected.

Discussion

The report can be considered as a failed replication, due to differing outcomes with the original article as presented by Lockwood et al. (2002). This is due to multiple methodological limitations.

Firstly, the sample in this study resorted to a convenience sample. This was due to a lack of resources such as time and incentives in order to reach an extensive sample group. Moreover, it was impossible to realize the effect sample (N = 967) in a timespan of just a couple of days without any resources. Therefore, the findings were mainly based on students within my own network. This might have led to favorable results of a certain outcome, because my network consists of mainly Asian students at the Communication Science masters program at the University van Amsterdam, which shows an overrepresentation of this demographic in the results for the extension.

Secondly, due to time constraints the testing period was not only short, but the survey was expected to be published soon enough in order to give respondents enough time to fill in the survey. This resulted in a survey that might have been published too early, which did not consider other interpretations of the questions. Since there was no pretest of the survey, which led to issues with formulations that caused respondents to misunderstand the questions. For instance, Dutch students did not understand what a major was, so they were not able to fully fill in the survey, since they were redirected due to being considered not fit for this study. This was also the case for academic years, therefore these misinterpretations were adjusted in the dataset in order to include these students into the research.

The debriefing was necessary for the manipulation checks, subjects were manipulated. The survey stated that we asked about the academic goals and the strategies that the respondents preferred to reach those goals to assist an undergraduate thesis. This information was false, because the survey is designed for other educational purposes. Besides, the survey stated that the University of Amsterdam has been gathering data on students' experiences during and after their major to identify factors related to success and failure. This information was also false, because the experience of the role models that was read was a fabricated story. However, these manipulations were justified in order to have an attempt to generate similar results presented by Lockwood et al. (2002).

Nevertheless, the preregistration can be considered a success, since there were no covariates to be added and all findings were significant. Yet, the data collection and the implementation of it can be questioned, since the original article does not state certain adjustments, such as manipulation checks and adjustment ratings, where I suggested that role model adjustment ratings could be interpreted as a direct measure if people indeed perceived one role model as increasingly successful than the other.

The aim of the pre registered hypotheses was to replicate the study of Lockwood et al. (2002), but the findings did not support the replication to the degree that I can definitely state that it was a success. This can be due to several methodological choices made in stage 1 or by the data collection procedure.

Besides this fact, a methodological choice that was chosen was to implement a varimax rotation in the factor analysis with the intention to minimize the number of variables that have high loadings on each factor and that it may simplify the interpretation. However, a direct oblimin should have been a better rotation, since vectors transform that are associated with a principal factor analysis.

With regard to the post hoc analyses, the attempt of replicating H1, H2 and H3 resulted in insignificant findings, which does not correspond to the Lockwood et al. (2002) article. They were able to find significance in the post hoc tests where I have not in the replication. Moreover, the possible finding of the post hoc test of H4 was also insignificant similar to the article of Lockwood et al. (2002). This finding can be considered to be successfully replicated to a certain extent, yet there are differences between the datasets mentioned, since I implemented a convenience sample and did not generate a sample that adhered to the power analysis, that may affect the result.

A remarkable finding was that the pairwise comparison of the two-way ANOVA portrayed that goal prevention priming ($M_{difference}$ = .877) was higher than goal promotion

priming ($M_{difference}$ = .199). It was expected that the promotion model would be more present in the findings, similar to Lockwood et al. (2002). This can be characterized by the particular demographic of the convenience sample that was considered for this replication.

With regard to the extension, it is a prerequisite for independent sample t-tests that N > 100 for each group (collectivistic and individualistic), a normal distribution and variances that are equal in both groups. Nevertheless, the replication consisted of N < 100 for each group and it was not normally distributed, since there were more collectivistic students (N = 45) than individualistic (N = 28). Therefore, the findings cannot be deemed representative and a successful extension of the research, although they are presented as significant in the dataset and the replication.

While the findings were significant, we cannot conclude whether the moderator of cultural background is the definitive factor for this or there is another moderator that might affect this significance. Therefore, I suggest conducting another replication of the study that grants more time, resources, adheres to the power analyses and a diverse sample rather than a convenience sample. When this has been realized, a replication of the extension can be conducted to reaffirm the findings generated in this report.

Replication is a fundamental method for scientists to support scientific findings and avoid merits in academia. However, replication is undermined and is therefore challenging to publish, which leads to scholars not willing to devote their resources on these practices. Yet, this replication portrays how important resources are for the performance of a replication and that it has significant effects on justifying findings made by previous communication science scholars. Although this report failed to replicate the study of Lockwood et al. (2002), this does not entail that it does not hold any meaningful findings. meaning of the replication

Communication science research contributes to social scientific comprehension of human communication with the assumption that the study has to be replicable (McEwan et al., 2018). The particular study of Lockwood et al. (2002) proved to be challenging to replicate and this reaffirms the fact that it is fundamental to make methodological procedures and data collection as transparent as possible. Moreover, replication holds broader implications for considering communication science as an academic field. As a communication scholar I implore that replications are not to be undermined and to be conducted frequently on emerging articles in the field based on the findings of this report.

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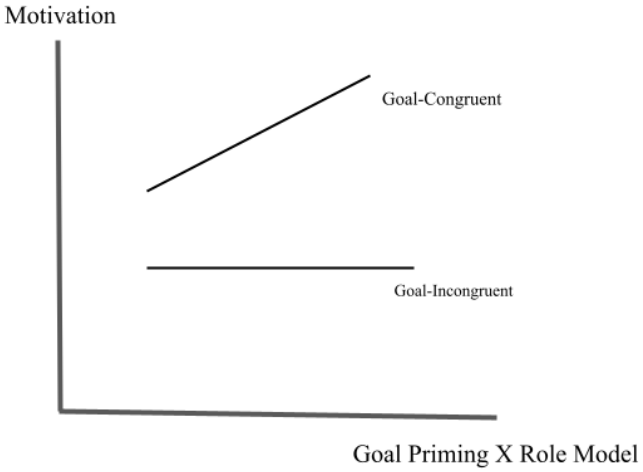
Appendix

Appendix A - Divergently and Positively Contingent Moderation Visualisation



Appendix B - Survey

EXAMPLE FACTSHEET PARTICIPANTS 16 YEARS AND OLDER
(online and offline research)

1) Goal of the study

Dear participant,

First, thank you for your interest in participating in this research project! Before the experiment starts, it is important that you are well-informed about the procedure. Therefore, we would like you to read this information letter carefully. Please do not hesitate to ask for clarification about this text or the general procedure. If anything is unclear, the researcher will gladly answer your questions.

In this study, named 'life transitions', we are interested in the motivations of students for their major. Therefore only participants who are 18 years and older and are currently enrolled as a student are allowed to participate in this study. The survey will take approximately 10 minutes.

2) Procedure

Participation in the study entails no risks or inconveniences. Moreover, participation in this study takes approximately 10 minutes. When you participatein the whole study, you will receive our eternal gratitude: "The University of Amsterdam (UvA) is legally obliged to inform the tax authorities about financial compensation to subjects. You may receive a letter from the UvA with a payment summary and information about the tax return"

3) Information about the research

As this research is being carried out under the responsibility of the The Amsterdam School of Communication Research (ASCoR), which is part of the University of Amsterdam (UvA), we can guarantee that:

A) Your personal information (about who you are) remains confidential and will not be shared without your explicit consent. Your research data will be analyzed to answer the research question as described above in the goal of this study. Note that further processing of your data is possible, provided that this is compatible with this purpose. Research data published in scientific journals will be anonymous and cannot be traced back to you as an individual. Finally:
Completely anonymized data can be shared with other researchers.

B) [Optional] No later than 2 months after completion of the study, you can obtain a summary of the research results. If you wish to receive this, please send an e-mail to the researchers (see below).

may receive a letter from the UvA with a payment overview and information about tax return.

5) More information

We as researchers are responsible for:

- Your anonymity is guaranteed and your answers or data will not be passed on to third parties under any circumstances unless you have given explicit permission for this in advance.
- You can refuse to participate in the survey or terminate your participation prematurely without stating your reasons. You can also withdraw your consent afterwards (within 24 hours after participation) for the use of your answers or data for the study.
- There will be no significant risks or inconveniences to you by participating in the survey, will not be deliberately misled, and will not be confronted with explicitly offensive material.
- You can receive a research report no later than five months after the end of the research, in which the general results of the research are explained.

For more information about this research and the invitation to participate in it, you can at all times contact Helge Moes: at helgemoes@gmail.com.

If you have any complaints or comments as a result of your participation in this research, you can contact the member of the Ethics Committee of the Communication Science department,

at the following address: ASCoR secretariat, Ethics Committee, University of Amsterdam, PO Box 15793, 1001 NG Amsterdam; 020-525 3680; ascor-secr-fmg@uva.nl. Confidential treatment of your complaint or comment is guaranteed.

Hopefully, we have been able to inform you sufficiently, and we would like to thank you for participating in this survey in advance.

With kind regards,

Kind regards,

The research team (Roeland Dubèl, Erchen Shi, Woody Liu, Helge Moes)

INFORMED CONSENT (Online study)

[*This text is to be placed at the start of the questionnaire, and participants will not be able to continue unless they have agreed to the following*]

If you would like to participate in the survey, click on "Yes" below. With this you declare:

- I am 16 years or older.
- I have read and understood the information.
- I agree to participate in the study and to use the data obtained with it.
- I reserve the right to withdraw this consent without giving any reason. [For anonymous data this is only during the study.]
- I reserve the right to stop the study at any time I wish.

- Yes, I participate (→ to start of research)
- No, I am not participating (→ to "thanks for your interest" page and then to the end)

[*This text is to be placed at the end of the questionnaire, forced response*]

For anonymous data collection:

- By clicking this box, I agree to participate in this study and to submit my data for analysis.
- By clicking this box, I **don't** agree to participate in this study and submit my data for analysis.

[Terms & conditions]

We would now like to know if you agree with the following terms & conditions:

- I hereby declare that I have been informed, in a manner that is clear to me, about the nature and method of the investigation. I am aware that the results of the survey are stored.
- I voluntarily agree to participate in this study. I reserve the right to withdraw this consent without having to give a reason. I realize that I can stop the investigation at any time.
- If my research results are used in scientific publications or made public in any other way, this will be done completely anonymously. My personal data will not be viewed by third parties without my express permission.
- If I would like more information, now or in the future, I can contact Helge Moes, at helgemoes@gmail.com.
- For any complaints about this research, I can contact the Ethics Committee on behalf of ASCoR, at the following address: ASCoR secretariat, Ethics Committee, University of Amsterdam, Kloveniersburgwal 48, 1012 CX Amsterdam; 020-525 3680; ascor-secr-fmg@uva.nl.

Q1) Do you agree with the terms and conditions as presented above?

- ○ Yes, I have read the terms and conditions, and I give permission under those terms and conditions.
- ○ No, I do not give permission under those terms and conditions.

→ *if 'no' is selected the respondent will be redirected to the end.*

[Age]

Q2) What is your age? Please only use numbers in your answer.

…

→ *if the respondent is younger than 18 years old the respondent will be redirected to the end.*

[Sex]

Q2) What is your sex?

- Men
- Woman
- Non-binary
- Other, namely: …

[Cultural Background]

Q3) With which cultural background do you identify the most?

- Eastern (Asia)
- Western (European)
- Both backgrounds
- Other, namely …

[Academic major]

Q4) What is your academic major? Please write the full name of your major in English and check your input for possible spelling mistakes.

…

- I am currently not enrolled in an academic major.

→ *if the respondent is not enrolled in a major the respondent will be redirected to the end.*

Q5) In which year are you of your academic major? Please only use numbers in your answer.

…

Respondents will see one of two conditions (either the promotion or the prevention condition) on a random basis.

We will now ask questions about your academic goals and the strategies you prefer to reach those goals. This information is needed to assist an undergraduate thesis.

[Goal priming manipulation: promotion]

Q5A) What is a positive academic outcome that you might want to achieve?

…

Q6A) Which strategy could you use to successfully promote this positive academic outcome?

…

[Goal priming manipulation: prevention]

Q5B) What is a negative academic outcome that you might want to avoid?

…

Q6B) Which strategies might you use to successfully prevent this negative academic outcome?

…

Respondents will see one of three conditions (either a positive role model description, a negative role model description or no description).

The University of Amsterdam has been gathering data on students' experiences during and after their major to identify factors related to success and failure. We have been gathering information about students' impressions of how other individuals were coping with life transitions and about their own experiences and adjustment.

[Role model manipulation: positive role model / negative role model]

You will now get to read about the experience of [female → Emma / male → John] a recent graduate from your academic major [→ academic major].

"I have applied for a major scholarship for my dream postgraduate programme. I just found out I won that scholarship! [I just received the rejection and I cannot afford the tuition fee.] By the way, I found what I have learnt at university was really helpful [extremely unhelpful] - I have done two internships during my student life, and these experiences taught me a lot about my skills in professional and academic ways [I failed to find an internship related to my major or my knowledge during my student life, I only did some pretty boring stuff in fast food places and restaurants]. Two major companies have also contacted me about great positions that will be starting in the upcoming year [I also found a hard time getting good reference letters from my previous experiences to apply for the positions in large

companies]. I have never thought that I can make so many achievements [life can be so difficult for me]!

I used to wonder about my future during my first college year, what can I do after obtaining this university degree? I might further my study in the academic field, I might find a decent job in a company, or I might travel around the world. Right now, I feel like I am able to answer this question, I know where I am going and what I want [I feel like I still cannot see the answer, I am not sure where I am going to go from here]. And I am really satisfied with my life [And I feel extremely insecure and anxious]. The future I used to imagine, in fact, is always so bright [should never be like this]."

[Role model manipulation: none]

Respondents will see no role model description.

[Motivation]

We would now like to ask you a few statements about yourself. Please rate to what extent the statements are true to your own personal situation on a scale from 1 to 11, 1 being not at all true and 11 being very true.

Q7.1) I plan to put more time into my schoolwork.

Not at all true	1	2	3	4	5	6	7	8	9	10	11	Very true

Q7.2) I plan to study harder for tests and exams.

Not at all true	1	2	3	4	5	6	7	8	9	10	11	Very true

Q7.3) I plan to spend less time partying with friends.

Not at all true	1	2	3	4	5	6	7	8	9	10	11	Very true

Q7.4) I plan to put extra effort into the rest of my term papers.

Not at all true	1	2	3	4	5	6	7	8	9	10	11	Very true

Q7.5) I plan to keep up with reading assignments.

Not at all true	1	2	3	4	5	6	7	8	9	10	11	Very true

Q7.6) I plan to procrastinate less.

Not at all true	1	2	3	4	5	6	7	8	9	10	11	Very true

Q7.7) I plan to start studying for finals before the term ends.

Not at all true	1	2	3	4	5	6	7	8	9	10	11	Very true

Q7.8) I plan to spend more time at the library.

Not at all true	1	2	3	4	5	6	7	8	9	10	11	Very true

Q7.9) I plan to stop engaging in social activities that interfere with schoolwork.

Not at all true	1	2	3	4	5	6	7	8	9	10	11	Very true

Q7.10) I plan to avoid wasting time.

Not at all true	1	2	3	4	5	6	7	8	9	10	11	Very true

Q7.11) I plan to be more organised.

Not at all true	1	2	3	4	5	6	7	8	9	10	11	Very true

Q7.12) I plan to avoid missing work deadlines.

Not at all true	1	2	3	4	5	6	7	8	9	10	11	Very true

Q7.13) I plan to be less casual about schoolwork.

Not at all true	1	2	3	4	5	6	7	8	9	10	11	Very true

Q7.14) I plan to focus more on my studies.

Not at all true	1	2	3	4	5	6	7	8	9	10	11	Very true

[Career stress]

We would now like you to reflect about how you see your own life transition in the (near) future. Please state to what extent you agree or disagree with the following statements on a scale from 1 to 7.

Q8.1) I am concerned that I do not have enough information about the career I want.

Totally disagree	1	2	3	4	5	6	7	Totally agree

Q8.2) I feel frustrated because I do not know what kinds of qualifications are needed for the career I want.

Totally disagree	1	2	3	4	5	6	7	Totally agree

Q8.3) I feel frustrated because I am not exactly sure how I should prepare for the career I want.

Totally disagree	1	2	3	4	5	6	7	Totally agree

Q8.4) I feel frustrated because there are not that many people who are helping me prepare for my career.

Totally disagree	1	2	3	4	5	6	7	Totally agree

Q8.5) I feel frustrated because I do not know what is needed for my career.

Totally disagree	1	2	3	4	5	6	7	Totally agree

Q8.6) I am worried that there are not enough positions available in my career field.

Totally disagree	1	2	3	4	5	6	7	Totally agree

Q8.7) I am concerned that I cannot pass the required exams for the career I want.

Totally disagree	1	2	3	4	5	6	7	Totally agree

Q8.8) I feel stressed because there are a lot of things to do to get a successful career.

Totally disagree	1	2	3	4	5	6	7	Totally agree

Q8.9) I am worried that I might not get the career I want.

Totally disagree	1	2	3	4	5	6	7	Totally agree

Q8.10) I feel stressed because it is hard to study for my classes and prepare for a career at the same time

Totally disagree	1	2	3	4	5	6	7	Totally agree

[Future Anxiety]

We would like to know more about your attitude towards your future. Indicate the number that most accurately defines your point of view. Please indicate 7 if a given statement accurately describes your attitude, and indicate 1 if the statement is not true.

Q9. 1) I am afraid that the problems which trouble me now will continue for a long time.

Decidedly false	1	2	3	4	5	6	7	Decidedly true

Q9. 2) I am terrified by the thought that I might sometimes face life's crises or difficulties.

Decidedly false	1	2	3	4	5	6	7	Decidedly true

Q9. 3) I am afraid that in the future my life will change for the worse.

Decidedly false	1	2	3	4	5	6	7	Decidedly true

Q9. 4) I am afraid that changes in the economic and political situation will threaten my future.

Decidedly false	1	2	3	4	5	6	7	Decidedly true

Q9. 5) I am disturbed by the thought that in the future I won't be able to realize my goals.

Decidedly false	1	2	3	4	5	6	7	Decidedly true

[Role model adjustment / manipulation check]

If role model manipulation = 0 → skip this question.

We would now like to know how you view the person in the story you read. Please rate to what extent you think the following statements apply for the person in the story on a scale from 1 to 9, 1 being not at all and 9 being very.

Q8.1) How successful do you think this person is?

Not at all	1	2	3	4	5	6	7	8	9	Very

Q8.2) How well-adjusted do you think this person is?

Not at all	1	2	3	4	5	6	7	8	9	Very

Q8.3) How prosperous do you think the life transition of this person is?

Not at all	1	2	3	4	5	6	7	8	9	Very

Q8.4) How promising do you think the life transition of this person is?

Not at all	1	2	3	4	5	6	7	8	9	Very

Q8.5) How untroubled do you think the life transition of this person is?

Not at all	1	2	3	4	5	6	7	8	9	Very

[Believability check]

If role model manipulation = 0 → skip this question.

Q9) Do you believe that the story that you read is a real story from an actual postgraduate of your academic major?

- ○ Yes I do
- ○ No I do not

[Debriefing]

We would like to thank you for participating in this survey.

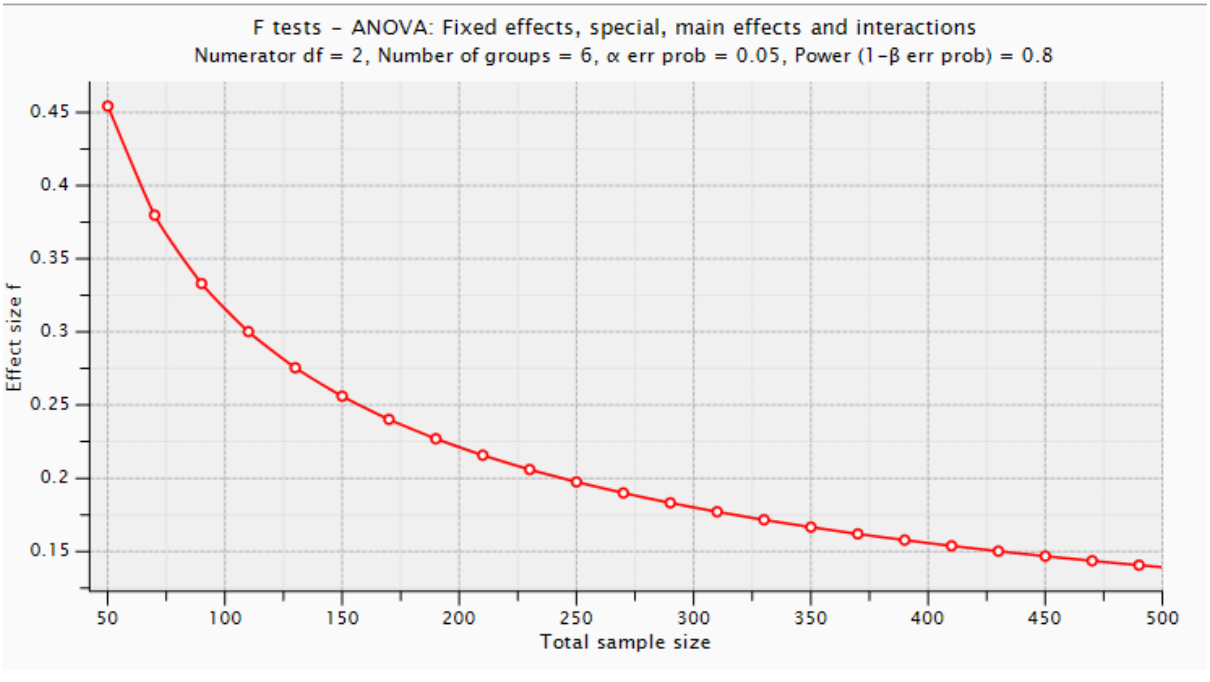
We would like to disclose the following:

- The survey stated that we asked about your academic goals and the strategies you prefer to reach those goals to assist an undergraduate thesis. This information is false. The survey is designed for educational purposes.

- The survey stated that the University of Amsterdam has been gathering data on students' experiences during and after their major to identify factors related to success and failure. This information is false. The experience you read is a fabricated story.

If any questions or remarks remain, please contact Helge Moes: helgemoes@gmail.com.

Appendix C - Sensitivity Analysis



Appendix B - Syntax

DATASET ACTIVATE DataSet1.

Exploratory analysis

Congruence variable

IF ((Goalprimingpromotion=1 & Rolemodelpositive=3) | (Goalprimingprevention=2 & Rolemodelnegative=4)) Congruence = 1.
IF ((Goalprimingpromotion=1 & Rolemodelnegative=4) | (Goalprimingprevention=2 & Rolemodelpositive=3)) Congruence = 2.

```
IF ((Goalprimingpromotion=1 & Rolemodelnone=5) | (Goalprimingprevention=2 &
Rolemodelnone=5)) Congruence = 3.
EXECUTE.

T-TEST GROUPS=Congruence(1 2)
  /MISSING=ANALYSIS
  /VARIABLES=Average_Motivation
  /CRITERIA=CI(.95).

*Preregistered*

*Filter*

USE ALL.
COMPUTE filter_$=(Finished = 1 & major = 1 & age >= 18 ).
VARIABLE LABELS filter_$ 'Finished = 1 & major = 1 & age >= 18 (FILTER)'.
VALUE LABELS filter_$ 0 'Not Selected' 1 'Selected'.
FORMATS filter_$ (f1.0).
FILTER BY filter_$.
EXECUTE.


*Randomization check*

CROSSTABS
  /TABLES=cultural_background sex BY Goalpriming Rolemodel
  /FORMAT=AVALUE TABLES
  /STATISTICS=CHISQ CORR
  /CELLS=COUNT EXPECTED ROW COLUMN
  /COUNT ROUND CELL.

*Averages*
```

```
COMPUTE
Average_Adjustment=MEAN(adjustment_1,adjustment_2,adjustment_3,adjustment_4,adjustment_5).
EXECUTE.

COMPUTE
Average_Motivation=MEAN(motivation_1,motivation_2,motivation_3,motivation_4,motivation_5,

motivation_6,motivation_7,motivation_8,motivation_9,motivation_10,motivation_11,motivation_12,
   motivation_13,motivation_14).
EXECUTE.

*Manipulation check*

DATASET ACTIVATE DataSet1.
T-TEST GROUPS=Rolemodel2(3 4)
  /MISSING=ANALYSIS
  /VARIABLES=Average_Adjustment
  /CRITERIA=CI(.95).

*Regression analysis*

REGRESSION
  /MISSING LISTWISE
  /STATISTICS COEFF OUTS CI(95) R ANOVA
  /CRITERIA=PIN(.05) POUT(.10)
  /NOORIGIN
  /DEPENDENT age
  /METHOD=ENTER academic_year.

*Reliability test*
```

```
RELIABILITY
  /VARIABLES=motivation_1 motivation_2 motivation_3 motivation_4 motivation_5
motivation_6
    motivation_7 motivation_8 motivation_9 motivation_10 motivation_11 motivation_12
motivation_13
    motivation_14
  /SCALE('ALL VARIABLES') ALL
  /MODEL=ALPHA
  /SUMMARY=TOTAL.

RELIABILITY
  /VARIABLES=adjustment_1 adjustment_2 adjustment_3 adjustment_4 adjustment_5
  /SCALE('ALL VARIABLES') ALL
  /MODEL=ALPHA
  /SUMMARY=TOTAL.

*Factor Analysis*

FACTOR
  /VARIABLES adjustment_1 adjustment_2 adjustment_3 adjustment_4 adjustment_5
motivation_1
    motivation_2 motivation_3 motivation_4 motivation_5 motivation_6 motivation_7
motivation_8
    motivation_9 motivation_10 motivation_11 motivation_12 motivation_13 motivation_14
  /MISSING LISTWISE
  /ANALYSIS adjustment_1 adjustment_2 adjustment_3 adjustment_4 adjustment_5
motivation_1
    motivation_2 motivation_3 motivation_4 motivation_5 motivation_6 motivation_7
motivation_8
    motivation_9 motivation_10 motivation_11 motivation_12 motivation_13 motivation_14
  /PRINT UNIVARIATE INITIAL CORRELATION SIG KMO EXTRACTION
ROTATION
  /FORMAT SORT BLANK(.60)
  /PLOT EIGEN
```

```
  /CRITERIA MINEIGEN(1) ITERATE(25)
  /EXTRACTION PAF
  /CRITERIA ITERATE(25)
  /ROTATION VARIMAX
  /METHOD=CORRELATION.

*Believability*

FREQUENCIES VARIABLES=believability
  /STATISTICS=STDDEV MINIMUM MAXIMUM MEAN
  /BARCHART FREQ
  /ORDER=ANALYSIS.

*Post Hoc*

*H1 / H2*

UNIANOVA Average_Motivation BY Goalpriming Rolemodel
  /METHOD=SSTYPE(3)
  /INTERCEPT=INCLUDE
  /POSTHOC=Goalpriming Rolemodel(BONFERRONI)
  /EMMEANS=TABLES(OVERALL)
  /EMMEANS=TABLES(Goalpriming) COMPARE ADJ(BONFERRONI)
  /EMMEANS=TABLES(Rolemodel) COMPARE ADJ(BONFERRONI)
  /EMMEANS=TABLES(Goalpriming*Rolemodel) COMPARE(Goalpriming)
ADJ(BONFERRONI)
  /CRITERIA=ALPHA(0.05)
  /DESIGN=Goalpriming Rolemodel Goalpriming*Rolemodel.


*H3 / H4*

UNIANOVA Average_Motivation BY Congruence
  /METHOD=SSTYPE(3)
```

```
  /INTERCEPT=INCLUDE
  /POSTHOC=Congruence(BONFERRONI)
  /CRITERIA=ALPHA(0.05)
  /DESIGN=Congruence.

*Extension*

*H5*

T-TEST GROUPS=Cultural_Background_Recoded(1 2)
  /MISSING=ANALYSIS
  /VARIABLES=Average_Motivation
  /CRITERIA=CI(.95).
```