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Correlations of Fundamental Social Motives with Personality Measures and Life History Variables

Abstract

Background: In response to the replication crisis in the field of psychology, the authors conduct a replication of the Neel et al. (2016) (1) study examining individual differences in fundamental social motives.

Methods: Using the Fundamental Social Motives Inventory, we explore the relationships of the fundamental social motives to other individual differences and personality measures and the extent to which life history variables (e.g., age, sex, childhood environment) predict individual differences in the fundamental social motives. In addition to the replication study, the authors also incorporate the Behavioral Inhibition/Activation Scale (BIS/BAS) as a new variable to determine this measure of personality's correlation with all seven fundamental social motives of Self-Protection, Disease Avoidance, Affiliation, Status, Mate Seeking, Mate Retention, and Kin Care. A total of 34 participants are recruited from Amazon Mechanical Turk to complete the measures of personality under question. The replication criteria are set at ±0.15 r/β-units from the original study results and effect sizes greater than or equal to r/β=0.5 have to demonstrate statistical significance at the p<0.05 level.

Results: Results demonstrate that between a third and a half of all effect sizes replicate Neel et al.'s (1) findings.

Limitations: These results should be considered carefully with respect to the low sample size of our study

Conclusion: The BIS/BAS variable proves to be most informative, indicating that the seven motives cluster under either the BIS or BAS factors with medium to large strengths of correlation. These findings contribute to discussions on considering the most accurate measures of social motivation and the implications of individual differences in psychology's understanding of such motivational systems.

Introduction

Social motivation is a defining feature of the cognitively gifted human; what differentiates us from other animal species confined to biological motives of a Darwinian nature. Beyond the primitive goals of obtaining food and passing on our genes to viable offspring, human motivation extends to higher levels in Maslow's hierarchy of needs and is often tied to our social nature.(2) Although an over-arching aspect of what makes us all human, the fundamental social motives are also key to understanding individual differences that lend to people's cognitive uniqueness. These individual differences in motivation – and by extension, the fundamental social motives that drive the differences – are worthy of extensive research as key predictors of perception and behavior in human psychology.(3) In order to have a descriptive/explanatory value in the study of personality, the biologically-informed fundamental social motives approach is built upon a multidisciplinary perspective of how humans have adapted to their social nature and are thus defined by Neel et al. (1) as "systems shaped by our evolutionary history to energize, organize and select behavior to manage recurrent social threats and opportunities to reproductive fitness". From existing literature and established theory, fundamental social motives include Self-Protection, Disease Avoidance, Affiliation, Status Seeking, Mate Seeking, Mate Retention, and Kin Care.(4) This seven-motives approach is a middle-ground between few aggregative, broad motives and many non-aggregative, specific goals.(5,6,7) The balance achieved is aimed at reflecting both distinctive and overlapping motivational inclinations in response to adaptive problems in social interactions. As part of their analytical predictability of human cognition and behavior, empirical findings suggest that activating the fundamental social motives attunes social phenomena such as stereotyping, conformity, intergroup prejudice, economic decision-making, political beliefs, self-presentation, aggression.(1) With such a wide range of functional applicability in the field of social psychology, research on the fundamental social motives approach and its links to other individual differences and personality measures is justified both in terms of scientific interest and importance.

It is intuitive that mere individual differences, as measured by various scales such as the Big Five inventory (8), would manifest as between-person variability in social motives. The social situation in which people find themselves also plays a key role in the motivational inclinations that then drive our behaviour and responses to the adaptive challenges and opportunities that social group living affords. For example, a situation containing a sexually attractive neighbor is likely to activate the fundamental social motive of Mate Seeking. However, individual characteristics and social situations alone cannot be credited for eliciting social motives. The prominence of motives in social situations is also a function of life history variables such as age, sex, relationship status, and parent status that calibrate the trade-offs faced by investing effort in particular social goals. (9) Applied to the previously-mentioned example of a sexually attractive neighbor, prominence of the Mate Seeking motive will likely vary between a 28-year-old single individual and a 58-year-old married parent. Thus, motivational inclinations are accounted for by the social situation, as well as the biological framework that describes how individuals' resource allocation changes over the course of a life-time. Life history theory (10,11) addresses trajectories and timing of shifts in the prominence of social motives, which account for significant between-person variability in motives.

In 2016, Neel et al. (1) published a paper on the relations among the different fundamental social motives, the relationships of the motives to other individual difference, and personality measures including the Big Five personality traits, the extent to which the motives are linked to recent life experiences, and the extent to which life history variables predict individual differences in the fundamental social motives. Their hypothesis that such relations exist addressed the prediction of individual differences in social motives based on factors that shape life history variables, thereby

providing a framework for understanding changes in social motives over the life span. Our team at McGill University sought to determine whether a direct replication of the Neel et al. (1) study – including analyses of fundamental social motives, conceptually related scales, and life history variables – would bear similar enough results to constitute reproducibility of the original effects found under the scientific method. The study's purpose is to provide a unifying, approach for examining individual differences at the level of fundamental social motives. By testing the hypotheses with this purpose in mind, we seek to further extend understanding of human motivation and personality. Our decision to conduct a replication as well as to add an original variable – BIS/BAS – is a response to the decade's replication crisis and serves as an effort to actively reorganize the disciplinary social structure that discourages reproducibility in the field of social psychology.(12)

Additional Variable Hypothesis

The Neel et al. (1) study had initially aimed for the Fundamental Social Motives Inventory to reflect both promotion and prevention of each of the seven motives. However, the distinctions between approach and avoidance behavior were not borne out in the scale development process. As defined by Ellen Crowe and E. Higgins (13), the promotion focused motivation framework is concerned with advancement, growth, and accomplishment. Promotion-focused goals are about doing something one would ideally do, theorized to ensure hits and minimize false negatives. In contrast, the avoidance focused motivation framework is concerned with security, safety, and responsibility. Prevention-focused goals are about fulfilling responsibilities and doing the things that you feel you ought to do, theorized to ensure correct rejections and minimize false positives.

We hypothesized that the Behavioral Inhibition/Activation Scale variable would correlate with the fundamental social motives in some way. Since no previous research had compared the two measures, it was not yet known which motives would correlate with either the inhibition or the activation systems, nor which direction these correlations would take. Furthermore, the addition of the BIS/BAS variable to this study is meaningful in that it adds validity to the fundamental social motives' theory since certain aspects of the two measures are inherently linked. As examples, we would expect that a participant who scores high on the Self-Protection motive would also score high on the Behavioral Inhibition Scale, and that a participant who scores high on the Mate Seeking motive would also score high on the Behavioral Activation Scale. Additionally, the comparison of the BIS/BAS measure and fundamental social motives inventory provides information about how the seven motives are similar and/or different from one another. Given that the current theory encompasses the largest set of motives ever proposed, significant clustering in the BIS and BAS dimensions could provide an argument that a more restricted set of motives might be just as good in conceptualizing human motivation. The specific and over-arching hypothesis involving the additional BIS/BAS variable: is promotion of achievement of a fundamental goal versus avoidance of failure to achieve that goal dependent on the fundamental social motive that drives that goal?

Methods

Design & Participant Demographics

This study is a correlational study, a type of research design where the kind of relationships naturally occurring variables have with one another is sought to be understood. Naturally occurring variables are those that have not undergone any manipulation by the researcher; in this case, all fundamental social motives, individual differences, life history variables, and behavioral inhibition/activation orientations.

We recruited participants from the Amazon Mechanical Turk (MTurk) platform, a crowdsourcing website where participants receive monetary compensation for answering surveys and/or participating in studies. For

this replication study, the participants were compensated with roughly $0.12/min. Given the fact that the participants volunteered for the study and that we did not control to get a representative sample of a certain population, the sample collected is considered a convenience sample. However, since the original study used the same sampling method and the same platform, it does not constitute a limitation regarding the replication potential of the study. Demographic data was collected amongst our partic-

Gender					
	n	%		n	%
Male	19	56%	Prefer not to specify	1	3%
Female	14	41%	TOTAL	34	100%

Age			Ethnicity		
	n	%		n	%
20-29	6	18%	Caucasian	24	71%
30-39	14	41%	Asian	5	15%
40-49	6	18%	Hispanic/Latino	2	6%
50-59	3	9%	African	1	3%
60-69	3	9%	Black (I'm not African)	1	3%
70-79	2	6%	Prefer not to specify	1	3%
TOTAL	34	100%	TOTAL	34	100%

Highest level of education attained			Religious affiliations		
	n	%		n	%
High school completed or GED	4	12%	Christian	18	53%
Some college	9	26%	Atheist	10	29%
Associate's degree (2 years)	2	6%	Agnostic	3	9%
Bachelor's degree (4 years)	12	35%	Noahide	1	3%
Graduate or professional degree	7	21%	Hindu	2	6%
TOTAL	34	100%	TOTAL	34	100%

Household income			Political beliefs		
	n	%		n	%
Under $20,000	5	15%	1 very conservative	4	12%
$20,000-$29,999	6	18%	2 conservative	4	12%
$30,000-$39,999	7	21%	3 somewhat conservative	1	3%
$40,000-$49,999	2	6%	4 neutral	4	12%
$50,000-$59,999	4	12%	5 somewhat liberal	6	18%
$60,000-$79,999	5	15%	6 liberal	8	24%
$80,000-$99,999	4	12%	7 very liberal	7	21%
Decline to answer	1	3%			
TOTAL	34	100%	TOTAL	34	100%

Table 1. Demographics from the particpants of the replication study.

ipants and it was found that our sample consisted of roughly equal male and female participants, mostly Christian Caucasians between the ages of 20 and 49 years old (see Table 1). In terms of level of education, household income, and political beliefs, our sample showed great diversity.

Procedure

Participants first responded to items assessing their relationship status and parent status, so that the Mate Retention and Kin Care (Child) scales could be presented only to those in relationships and those with children, respectively. Participants completed the Fundamental Social Motives Inventory (66-item set retained for analyses reported in original paper), the Big Five Inventory, and questions about their life experiences. By random assignment, participants then completed one of two possible sets of measures of individual differences in constructs often used to measure fundamental social motives or motive-relevant vulnerabilities and strategies: one set consisted of the Sociosexual Orientation Inventory (14), Perceived Vulnerability to Disease Scale (15), and the Dominance and Prestige Scales (16); the other set consisted of the Belief in a Dangerous World Scale (17), the Need to Belong Scale (18), and the Experiences in Close Relationships–Revised Scale.(19)

All participants then provided information on a number of life history variables, beginning with their age (continuous) and sex (male coded -1, female coded 1). Participants used the following response options to indicate their relationship status: married, in a committed relationship, dating one person, separated, divorced, and single. Only those who indicated that they were either married, in a committed relationship, or dating one person were considered "in a relationship" (coded 1), and only those who responded as single, divorced, or separated were considered "not in a relationship" (coded -1). Participants indicated whether they had children with a "yes" (coded 1) or "no" (coded -1). The childhood stability scale

consisted of three items (e.g., "Compared to the average person, how [stable, predictable, hard] was your home life when you were growing up?" 1=very [stable/predictable/easy], 7=very [unstable/unpredictable/hard], reverse-coded so that higher scores reflect greater stability. The childhood resources scale consisted of four items (e.g., "My family usually had enough money for things when I was growing up," 1=strongly disagree, 7=strongly agree). Although people may not have veridical memories of childhood experiences (20), and thus their self-reported memories of childhood likely contain some error, Neel et al. (1) drew items used from past research that has successfully used these items to assess the influence of childhood environments on life history strategies.(21) The current resources scale consisted of two items (e.g., "I don't currently need to worry much about paying bills," 1=strongly disagree, 7=strongly agree). Finally, all participants completed the BIS/BAS scales. Results of this measure would be mapped onto three BAS-related scales and only one BIS-related scale. The instrument author does not encourage combining the BAS scales because they focus on different aspects of incentive sensitivity.(22)

Analytical Strategy

The sample size n=34 was obtained after the elimination of a) any participant who did not complete the study, b) two participants who "completed" the study within 5 and 8 minutes – well below the average time of 26.7 minutes – and c) two suspected internet bots – one whose answer was tremendously irrelevant to the survey question, and another whose reported age of conception was earlier than puberty. While the researcher initially intended to recruit around 100 participants, the lack of funding did not allow them to achieve this objective. The subjective decision to eliminate these participants were made according to the principle of eliminating data that we are absolutely certain is defective. This practice is not considered p-hacking because the effects of removing versus retaining the data were never compared or considered in the decision-making process. Despite increasing our certainty regarding the remaining data, the elimination of some data contributed to the low number of our sample size, which has negative effects on the certainty of our replication conclusions.

For the fundamental social motives scale, selected items were averaged into eleven scores, one for each motive and sub-motive. The conceptually related scales – Sociosexual Orientation Inventory, Perceived Vulnerability to Disease, Dominance and Prestige, Belief in a Dangerous World, Need to Belong, and Experiences in Close Relationships (Revised) Scales – each gave a single score corresponding to an average of all scale items. As for the Life History data, each of the seven questions yielded a single item score. The scores for age, childhood stability, childhood resources, and current resources were on a continuum. The scores for sex, relationship status, and parent status were coded in a binary fashion, where men=-1, women=1; single=-1, in relationship=1; non-parent=-1, parent=1.

The researchers computed correlation coefficients between each fundamental social motive score and each additional scale, but only the ones with meaningful relationships were further analyzed and compared with the correlation coefficients found in the Neel et al. (1) study. Correlation coefficients were also computed between the fundamental social motives scores and the single item scores for the Life History questions. Furthermore, three scales were presented to only a subset of the participants. As such, correlation coefficients were calculated for the Mate Retention (general) and Mate Retention (breakup concern) scales only amongst participants who indicated being in a relationship (n=23). The same went for the Kin Care (child) scale, which was only presented to participants who had a child (n=23).

Results

Since the correlations of fundamental social motives with the behavioral inhibition/ activation scales were not part of the Neel et al. (1) study, there are no replications to be assessed. The data obtained can give us valuable preliminary information on the relationships between the motives and this social motivation framework. Beyond assessment of the correlations themselves, two intriguing patterns can be discerned. First, that the sta-

tistically significant correlations highlighted are directionally consistent, where significant Behavioral Inhibition Scale (BIS) correlation signs are in the opposite direction of signs of significant Behavioral Activation Scale (BAS) correlations (see Table 2). The second pattern is the emergence of two clusters of motives: the first group, which includes motives that correlated either negatively with BIS or positively with BAS, can be labelled as the Behavioral Activation group. Within this category, Affiliation (Group) motive significantly correlated with all BAS indicators (r=0.40) and with BIS (r=-0.39). Status motive also correlated with BAS (drive) (r=0.30) and BAS (fun seeking) while Mate Retention (General) motive correlated with BAS (reward response) (r=0.50). The second group, which includes motives that correlated either positively with BIS or negatively with BAS, can be labelled as the Behavioral Inhibition group. Within this category, Self-Protection motive (r=-0.42) and Disease Avoidance motive (r=-0.34)

Fundamental Social Motive	BAS (Drive)	BAS (Fun Seeking)	BAS (Reward Response)	BIS
	r =	r =	r =	r =
Self-Protection	-0.30	-0.42*	-0.21	0.30
Disease Avoidance	-0.20	-0.34*	0.00	0.30*
Affiliation (Group)	0.40*	0.40*	0.40*	-0.39*
Affiliation (Exclusion Concern)	0.05	0.16	-0.45*	0.25
Affiliation (Independence)	-0.41*	-0.50*	-0.20	0.50
Status	0.30*	0.30*	-0.20	-0.34
Mate Seeking	0.05	0.31	-0.19	0.02
Mate Retention (General)	0.24	0.02	0.50*	0.07
Mate Ret. (Breakup Concern)	0.32	0.24	0.00	0.04
Kin Care (Family)	-0.16	-0.11	-0.60*	-0.09
Kin Care (Child)	0.14	0.37	0.00	-0.40

Note. *p < 0.05.

Table 2. Fundamental Social Motives as Predictors of Behavioral Inhibition and Behavioral Activation Systems.

significantly correlated with BAS (fun seeking). Disease Avoidance motive was also associated to BIS (r=0.30). Affiliation (Independence) motive was negatively correlated with BAS (drive) (r=-0.41) and BAS (fun seeking) (r=-0.50)

Replication Criteria

Using the Fundamental Social Motives Inventory, our team explored the relationships of the fundamental social motives to other individual difference and personality measures; the extent to which fundamental social motives are linked to recent life experiences; and the extent to which life history variables predict individual differences in the fundamental social motives. As the study being replicated committed to the statistical significance requirements of p-value and effect size requirements of r- and β-values, the 2019 replication team committed to the following requirements for what is to be considered replication: 1) correlations found must be within 0.15 r/β-units of the original effect size reported. 2) correlations found must be in the same direction as the original results; with the exception of correlations within 0.15 r/β-units of one another around r/β = 0, in which case "no effect" is replicated. 3) r/β-values above 0.5 must be significant in order to ensure validity of the correlation found in order to be considered "replicated." The first two requirements are relatively intuitive in terms of justification. If two correlations are in opposite directions, the fundamental relationships that they describe are diametrically different and therefore clearly not replications of one another. Similarly, if two correlations are far apart
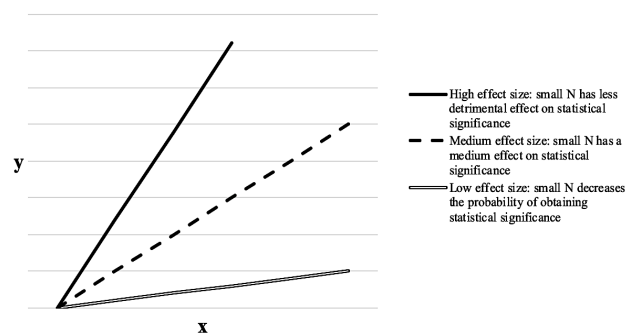

Figure 1. Theoretical representation of effect sizes in relation to statistical significance.

in effect size, they are effectively descriptions of two different correlations, just like two differently angled diagonal lines on an x-y correlation graph (see Figure 1).

The third requirement of replication is related to the statistical effects of a small sample size. When the effect size of a correlation is large – defined here as r/β≥0.5 – a small sample size theoretically should not have a detrimental affect on the certainty of the p-value. Therefore, it is expected that a truly high strength of correlation would be significant, despite our replication study's small sample size. Whenever the effect size of a correlation is large but not significant, we may thus question the validity of the strength of correlation and exclude the finding from what we consider to be replication. Contrastingly, when the effect size of a correlation is small – defined as r/β<0.5 – a small sample size does indeed decrease the certainty of the p-value. Therefore, it is not expected that a truly low strength of correlation be significant and whenever that is the case, we may attribute the non-significance of the strength of correlation to the small sample size and consider the finding as valid anyway.

Correlations of Fundamental Social Motives with their Conceptually Related Scales

When comparing the fundamental social motives and the related scales, we found that four correlation coefficients out of twelve replicated: the Self-Protection motive which correlates with Belief in a Dangerous world (r=0.51), the Affiliation (Exclusion Concern) which correlate with the Need to Belong scale (r=0.77), the Mate Retention (General) which correlates with the Avoidance scale (r=-0.57), and the Mate Retention (Break-up Concern) which correlates with the Anxiety Attachment scale (r=0.96) (see Table 3). Correlation of the Status motive with the Prestige scale is the only correlation found in the opposite direction of that reported by the original study. The remaining non-replications did not meet the requirement of falling within 0.15 r/β-units of the original effect size reported.

Fundamental Social Motives	Conceptually Related Scale	r (Neel et al.)	r (CREP)
Self-Protection	Belief in a Dangerous World	0.38*	0.51*
Disease Avoidance	Perceived Vulnerability to Disease	0.64*	0.20
Affiliation (Group)	Need to Belong	0.37*	0.19
Affiliation (Exclusion Concern)	Need to Belong	0.75*	0.77*
Affiliation (Independence)	Need to Belong	-0.46*	-0.08
Status	Dominance	0.52*	0.78*
Status	Prestige	0.33*	-0.10
Mate Seeking	Sociosexual Orientation Inventory	0.44*	0.72*
Mate Retention (General)	Avoidance	-0.45*	-0.57
Mate Retention (Breakup Concern)	Anxiety	0.84*	0.96*
Kin Care (Family)	Avoidance	-0.28*	-0.71*
Kin Care (Child)	Dominance Scale	-0.28*	-0.50

Note. *p < 0.05.

Table 3. Zero-Order Correlations of Fundamental Social Motives with their Conceptually Related Scales

Life History Predictors of Fundamental Social Motives

Our team replicated more than half of the correlations of life history predictors of the fundamental social motives (see Table 4). Out of the 74 correlations, 40 replicated and only 11 were in the opposite direction as the original findings. The remaining 23 correlations did not meet the requirement of falling within 0.15 r/β-units of the original effect size reported by Neel et al. (2016).(1) The most successfully replicated life history variable correlations are with the fundamental life variables of Status and Mate Seeking – both only one correlation away from perfect replication. Interestingly enough, the most poorly replicated life history variable correlations are with the fundamental life variables of Mate Retention – both General and Breakup Concern replicating in only one correlation out of the seven life history variables. Relationship Status in Mate Retention was not analysed since, by definition, the motive to

retain a mate would assume relationship status to be "in a relationship" with a β-value of 1.00. Similarly, Parent Status in Kin Care (Child) was not analysed since the motive to care for one's child would assume parent status to be "parent" with a β-value of 1.00.

	Self-Protection		Disease Avoidance		Affiliation (Group)	
	β (Neel)	β (CREP)	β (Neel)	β (CREP)	β (Neel)	β (CREP)
Age	-0.12*	-0.09	0.04	-0.20	0.00	-0.07
Sex	0.17*	0.30	0.08*	0.21	-0.01	-0.11
Relationship status	0.02	-0.24	0.00	-0.01	0.04	0.54*
Parent status	0.15*	-0.38	0.03	-0.15	0.10*	0.45*
Childhood stability	-0.04	-0.28	-0.05	-0.04	0.03	0.35
Childhood resources	0.07	0.51	0.05	0.14	0.05	-0.14
Current resources	-0.08*	-0.34	-0.02	-0.42	0.11*	0.10
	Affiliation (Exclusion Concern)		Affiliation (Independence)		Status	
	β (Neel)	β (CREP)	β (Neel)	β (CREP)	β (Neel)	β (CREP)
Age	-0.26*	-0.25	0.05	0.05	-0.20*	-0.17
Sex	0.06	0.08	0.06	0.11	-0.04	-0.05
Relationship status	-0.04	0.07	-0.10*	-0.39*	0.00	0.08
Parent status	-0.04	0.03	-0.02	-0.52*	0.04	0.09
Childhood stability	0.02	-0.33	-0.01	-0.35	-0.02	-0.36
Childhood resources	0.03	0.25	-0.01	0.08	0.11*	0.19
Current resources	-0.05	0.05	-0.05	-0.08	0.05	0.20
	Mate Seeking		Mate Retenton (General)		Mate Retention (Breakup Concern)	
	β (Neel)	β (CREP)	β (Neel)	β (CREP)	β (Neel)	β (CREP)
Age	-0.14*	-0.21	0.09*	0.26	-0.23*	-0.09
Sex	-0.17*	-0.06	0.18*	-0.09	-0.06	0.32
Relationship status	-0.52*	-0.25	N/A	N/A	N/A	N/A
Parent status	-0.04	0.08	-0.07	0.15	-0.02	-0.19
Childhood stability	-0.06*	-0.05	0.12*	0.33	-0.12*	-0.40
Childhood resources	0.04	0.11	-0.05	-0.21	0.04	0.35
Current resources	0.01	0.09	0.01	-0.06	-0.14*	0.36
	Kin Care (Family)		Kin Care (Child)			
	β (Neel)	β (CREP)	β (Neel)	β (CREP)		
Age	0.04	0.22	-0.22*	0.19		
Sex	0.17*	0.03	0.14*	0.36		
Relationship status	0.09*	0.09	-0.04	-0.12		
Parent status	0.16*	0.08	N/A	N/A		
Childhood stability	0.21*	0.47	0.22*	0.10		
Childhood resources	-0.02	-0.41	-0.11*	-0.15		
Current resources	0.03	-0.06	-0.19*	-0.16		

Note. *p < 0.05.

Table 4. Life History Predictors of Fundamental Social Motives

Conclusion

In Neel et al. (1), a large sample of participants showed that individual differences in the fundamental social motives relate meaningfully to other individual differences. In our replication study, a small sample of participants replicated the original findings in only one third of correlations between conceptually related fundamental social motives and scales of individual differences. Furthermore, Neel et al. (1) found that individual differences in the fundamental social motives can be partially accounted for by life history variables. In the replication of the study, more than half of the correlations between life history variables and each fundamental social motive were replicated. The addition of Behavioral Inhibition/Activation Scales demonstrated that promotion of achievement of a goal versus avoidance of failure to achieve that goal depends on the fundamental social motive that drives the goal.

Limitations

Overall, our replication team achieved partial replication of the Neel et al. (1) results. However, this is based on a researcher-determined definition of what constitutes a replication and the requirements that were put into place for analysis of the effects found. For example, if the requirement that correlations found must be within 0.15 r/β-units of the original effect size reported were narrowed to 0.10 r/β-units, many of the correlations considered replications would no longer meet requirements. This trivial change in definition would lower the 40/74 replication ratio to below 50%. In that case, we most likely would not consider the replication attempt even partially successful, rather concluding non-replication overall. Beyond the definition of replication, it is noteworthy to mention that many of the data in the original study was not collected, and many that were collected were not analysed. For example, a major aim of the Neel et al. (1) study was to build construct validity for the fundamental social motive scale. Therefore, not having performed any exploratory analysis on the items of the scale, nor having compared the fundamental social motives to the Big Five, can place limitations on our conclusions since we may not be certain that the

fundamental social motive scale is working the same way as it was in the original paper. If these concerns are most central to this replication project, many other factors could have influenced these results and they shall be discussed below.

The most evident limitation of the replication study is the small sample size and lack of statistical power. While the replication had a sample size of 34, the original Neel et al. (1) study had a sample size of 220–770. With such a clear discrepancy in sample size, external validity concerns make us doubt the extent to which the results can be generalized to other populations, other environments, other times, etc. Moreover, in terms of internal validity, history effects of the 3-year duration between the original study and the replication must be considered. Since 2016, the world has changed, society has changed, people have changed, and importantly, we believe MTurk might have also changed. Past research showed a shift in participants' motivation to join MTurk in the past years, approaching it as a full-time job rather than hobby-like.(23) Since then, message boards have appeared with discussions of payments and study features such as deception, etc. If the participants or tools of research themselves have changed between original and replication, then the data collected may reflect these changes rather than report on the true variables being targeted.

Beyond financial and technological limitations, some features of the correlational survey design also pose concerns about trusting the data obtained. One concern is the length of the study and the large number of items that participants are expected to commit their undivided attention to. It may be the case that as participants work their way through scale after scale, the quality and accuracy of the responses obtained diminishes progressively. In addition to this design limitation, order effects may be very prominent in a lengthy study. This is especially the case for the additional BIS/BAS variable placed at the end of the list of scales in order to stay true to the original study design. Furthermore, testing effects such as polarization may threaten the internal validity of the results. After completing scale after scale, repetition may lead to more extreme and polarized responses merely due to the structural aspects of the study. Future directions in this field of research must dedicate resources to limiting the many threats to validity endured by this study. However, on a more optimistic note, an unresolved question to explore is how to incorporate a parsimony objective in explaining the complex relationship between the fundamental social motives and all other variables addressed in this study.

Acknowledgements

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