The Link Between Self-esteem and Implicit Malleability Theories: a Meta-analysis

James H. Conigrave¹, Emma L. Bradshaw², Emma K. Devine², Joseph Ciarrochi², &
Baljinder K. Sahdra²

¹ The University of Sydney

² Institute for Positive Psychology and Education

Author Note

Correspondence concerning this article should be addressed to James H. Conigrave,
Level 6, King George V Building, Camperdown NSW 2006, AUSTRALIA. E-mail:
James.conigrave@sydney.edu.au

Abstract

Experiments suggest that people who believe their attributes are malleable should be more resilient in the face of failure. Does this mean that incremental theorists maintain higher self-esteem? We explore this question meta-analytically. We synthesised research from 34 studies to show that the relationship between self-esteem and incremental theories is generally weak. We performed moderation analysis to identify method, and sample features which predict effect size magnitude. Of note, implicit malleability theories were more strongly related to self-esteem when scales were self-, rather than other-focused, and when incremental, rather than entity items were used.

Keywords: Self-esteem, Implicit malleability theories, Correlation, Meta-analysis

Word count: 2,585

The Link Between Self-esteem and Implicit Malleability Theories: a Meta-analysis

Introduction

Prior authors have argued that incremental and entity theories of the self may constitute two self-systems. Incremental theorists (those who believe their traits are malleable) are more likely to draw self-worth from learning. In contrast, it has been argued that the self-esteem of entity theorists is more likely to be based on performance. Despite these claims, the link between self-esteem and implicit malleability theories has not been the primary focus of much research. In this paper we explore the relationship between implicit malleability theories and self-esteem meta-analytically.

Experimental research would suggest that by preventing trait attributions, incremental theories could buffer self-esteem from failures (Levy, Stroessner, & Dweck, 1998). It is therefore reasonable to assume that self-esteem and incremental theories would be positively linked. While the correlation between these two variables has been reported in multiple studies, the magnitude of this relationship, and the degree of heterogeneity has not been explored meta-analytically.

One potential source of heterogeneity may be the domain in which self-esteem and implicit theories are measured. Both self-esteem and implicit theories are considered to be domain specific. Prior research has shown that when the domain of self-esteem and the domain of an outcome are matched, the relationship between them tends to be stronger (Marsh & Craven, 2006). This may partly explain any heterogeneity in reported effect sizes. If the domain specificity theory holds for both implicit theories and self-esteem, their hierarchical structures may be similar.

It is not clear whether entity and incremental statements form two ends on a bipolar scale, or map onto separate factors. The original implicit theory scales used only entity items

(Dweck & Leggett, 1988), that is, items where respondents rated agreement to statements suggesting their attributes are fixed. For example, “You have a certain amount of intelligence and you really can’t do much to change it”. Only entity items were used because reports from earlier studies suggested that participants who endorsed entity theories in interviews would respond with high levels of agreement to incremental items (Dweck, Chiu, & Hong, 1995). Dweck et al. (1995) argued that incremental statements were so compelling, that participants would agree with them, whether or not they actually corresponded to their implicitly held beliefs. It is possible, as Dweck et al. (1995) suggests, that this lack of a correlation is due to insensitive responding to incremental items. However, an alternative explanation might be that incremental and entity beliefs do not exist on the same continuum and therefore should be treated as separate factors. Perhaps, incremental items and entity items tap into different aspects of perceived malleability and so it is possible to have both high entity and incremental beliefs in a single domain. For instance one might believe that attributes are influenced by both nature (genetics) and nurture (experiences) and so would also endorse incremental and entity items simultaneously to some degree. As such, the assumption that scales which use exclusively entity items tap into people’s incremental theories requires scrutiny. The frame of reference used in implicit malleability instruments also requires scrutiny.

Implicit theory instruments tend to employ items which reference people generally, for example, “you have a certain amount of intelligence and you really can’t do much to change it” (Dweck et al., 1995). However it is possible that people hold different theories for themselves than they do for others. Someone might feel that while most people can improve their mathematical ability, there is something special about them that makes them a lost cause. To address this, De Castella et al. (2013a) modified the format of implicit theory measures to make them self-focused, e.g., “No matter how hard I try, I can’t really change the emotions that I have”. De Castella and Byrne (2015) claim that these self-focused scales tap into the construct more effectively. If this is true, the reference point of implicit theory

scales (self vs other) should moderate effect sizes meta-analytically.

Research Aims

This paper aims to consolidate research on both self-esteem and implicit malleability theories using a meta-analytic synthesis of prior research. The primary aim is to measure the strength of the relationship between implicit theories and self-esteem. The secondary aim is to identify moderators of the link between self-esteem and implicit theories.

Research Questions and Hypotheses

Research Question. What is the magnitude of the association between incremental theories and self-esteem across all domains of both constructs (for example, academic, physical, and creative domains)?

Hypothesis 1. Incremental theories will be positively related to both self-esteem and self-concept. By reducing trait attributions (Levy et al., 1998), incremental theories should make failures less likely to affect self-image resulting in higher self-esteem/ self-concept.

Hypothesis 2. Incremental theories will be most strongly related to self-esteem when the domains of each scale are similar. For example, incremental theories of intelligence should be more strongly related to academic self-concepts, than physical self-concepts or self-esteem generally.

Hypothesis 3. Correlations between incremental theories and self-concept will be stronger when implicit theory scales reference the self rather than people generally. Scales which refer to people generally will not adequately reflect perceptions of self-malleability. People may feel their attributes are more or less malleable than other people.

Methods

Eligibility criteria

Studies were included which had quantitative measures, in any domain, of either self-esteem (including self-concept scales) or implicit malleability theories as described by Dweck et al. (1995). Studies in which full texts in English could not be obtained were excluded to ensure data extraction was accurate. Only original research was eligible for inclusion. Studies were accepted irrespective of cohort features (e.g. age, gender, socioeconomic status), which were assessed as moderators.

Four databases were used for finding eligible papers: ERIC, PsychINFO, Scopus and Web of Science. Additional papers were sourced from Google Scholar and included on advice from researchers in the relevant fields. Development of keywords

Search terms

Implicit theories was represented by variations of the term as follows: “implicit theory” “incremental theorist”, “entity theorist”, “fixed mindset”, or “growth mindset”. “Dweck” was also used as a keyword for implicit theories due to her prominence in the field of research (Dweck, 2000). Papers with self-esteem were located with variants of the following keywords: “self-esteem”, “self-concept”, “self-perception”, “self-appraisal”, “self-image”, “self-worth”, or “self-attributions”. Papers were returned that featured at least one of these keywords from both the implicit theory and self-esteem set.

Study screening

Eligible studies were imported into an Endnote library and duplicates were removed. We screened titles and abstracts with the assistance of two other researchers. Records were removed where all researchers unanimously agreed studies did not meet eligibility criteria. Full texts were obtained for all remaining records and then screened for eligibility. In cases of disagreements about the eligibility of certain studies, researchers discussed these cases until a unanimous decision could be made.

Data extraction

Data were extracted from the remaining studies into an Excel spreadsheet. Each row represented an effect size. In instances where multiple effect sizes were present in a single study, these effects were inputted on separated rows, and were linked by study ID. In this meta-analysis, studies only presented effect sizes as Pearson's r . Accordingly, no effect sizes needed to be mathematically transformed. Beyond effect size, other information was extracted about each study including publication year, cohort socioeconomic status, cohort gender ratio, mean age of subjects, the domain of the self-concept scale, which self-concept scale was used, the implicit theory domain, which implicit theory scale was used, whether the implicit theory scale referenced the self or people generally, the alphas of each scale, and finally, the effect size. Records were extracted mid-2017. If correlations could not be extracted, the authors were contacted with a request for the effect size.

Analysis

In meta-analyses effect sizes are assumed to be independent. However, single studies often report multiple effect sizes. These effects are likely to cluster due to common methodologies, and sample features. To control for the dependence of effect sizes, we use

multi-level meta-analytically structural equation modelling (MASEM) (Cheung, 2014b). This enables heterogeneity to be measured and controlled for between ($R^2_{(2)}$), and within studies ($R^2_{(3)}$). All analyses were performed in R (R Core Team, 2019). The package “metafor” was used to calculate effect sizes (Viechtbauer, 2010). The package “msemtools” was used to specify meta-analytic models, and to prepare tables and figures (Conigrave, 2019). The msemtools package is dependent on “metaSEM” which was used for the computation of all meta-analytic models (Cheung, 2014a). This paper was produced with “papaja” and “rmarkdown” to eliminate transcription errors and ensure reproducibility (Aust & Barth, 2018). The code to reproduce this paper is available in supplementary materials.

Moderators

A range of moderators were extracted from studies, including the age and gender ratio and education level of the sample; the domains of the growth mindset; and self-esteem scales; the growth mindset type (GMS type), that is, incremental, entity, or combined items; whether self-esteem and implicit theories domains were identical, similar or unrelated; whether the incremental theory scale was self-focused (e.g. “I am malleable”) vs. other focused (e.g. “people are malleable”).

Results

Study features

Records were published from 1994 to 2016. Sample sizes ranged from 80 to 10,040; the total sample size was 37,728. See Figure 1 for a PRISMA flow diagram (Moher, 2009).

Meta-analysis

Thirty-four studies (79 effects) presented data which could be pooled. The pooled correlation and 95% Wald CI was $r = 0.16$ (0.12, 0.20) (Figure 2). This indicates that incremental theories and self-esteem are positively linked (albeit weakly; Hypothesis 1). Inspecting the Q statistic revealed significant heterogeneity ($Q(df = 78) = 1637.34$, $p < 0.01$). Effect sizes were highly variable within and between studies. The heterogeneity at level 2 was 57.26%. The heterogeneity at level 3 was 34.02%.

Moderation analysis was performed in attempt to identify co-variates of the link between self-esteem and incremental theories (Table 1). “Gender” significantly moderated heterogeneity within studies ($R^2_{(2)} = 0.06\%$; $R^2_{(3)} = 0\%$), as did incremental scale type ($R^2_{(2)} = 54.25\%$; $R^2_{(3)} = 54.25\%$). Studies which used incremental scales, rather than entity scales, reported larger effect sizes. “Implicit theory frame” (Hypothesis 3) was a moderator of between-study heterogeneity ($R^2_{(2)} = 0\%$; $R^2_{(3)} = 78.55\%$). Studies which asked participants about self-theories rather than other-theories reported stronger links to self-esteem. Evidence was not found in support of the domain matching principle with regards to self-esteem and implicit theories (Hypothesis 2).

Publication bias

In order to test for the presence of publication bias, a funnel plot was produced (Figure 3). While substantial heterogeneity is visible, there is no obvious asymmetry. An egger’s regression test did not suggest funnel plot asymmetry ($p = 0.24$).

Discussion

The current study examined the relationship between implicit malleability theories and self-esteem using a meta-analytic approach. This study demonstrated that self-esteem and implicit theories are weakly linked positively. However, there substantial heterogeneity among estimates. This suggests that the link between self-esteem and implicit theories varies across settings and methods.

A few moderators were identified as potentially being important. The most important of these may be implicit-theory frame effects. Implicit theory measures that focused on the self, had much stronger links to self-esteem than implicit theories focused on others. Given that research is generally focused on the malleability of the self, rather than others (which may differ), it seems logical that scale items should also focus on the malleability on the self. Further research may clarify if implicit theory of self scales have superior psychometric qualities to implicit theory of other scales.

Another moderator was that incremental items related more strongly to self-concept than entity items. There has been some debate in the field regarding whether incremental items should be used at all. Dweck et al. (1995) suggested that entity and incremental items exist on the same bipolar spectrum and so rejection of incremental theories equates to endorsement of entity theories and vice-versa. In this study, it appears as though the relationship between implicit theories and self-concepts does differ in strength depending on whether scales used exclusively entity items, incremental items, or a combination of both. If these items were truly mirror images of each other than their relationship to other variables should not greatly differ.

Some sample features also predicted effect size. The link between implicit theories and self-esteem tended to be more strongly related for male samples. While causal orderings are unclear, this finding raises the question of whether incremental theories provide more benefit

to males than to females. If this is the case, it is likely that the benefit of incremental theories is moderated by other variables which may be missing from current models.

Of note, the link between self-esteem and implicit theories was not stronger when domains were matched. Prior work has suggested that implicit theories are domain specific (Hughes, 2015; Schroder, Dawood, Yalch, Donnellan, & Moser, 2016). There may be problems with the way implicit theory scales are constructed in various domains. Future psychometric work clarifying the hierarchical structure of implicit theories would be useful.

Limitations

This meta-analysis is cross-sectional, as such causal orderings cannot be established. Additionally, some related constructs such as genetic essentialism, competence, and self-efficacy were omitted. Some scales aiming to measure these constructs may have similar features to items measure self-esteem, self-concept, or implicit malleability theories.

Conclusion

Implicit theories and self-esteem are weakly related. Stronger incremental theories tend to be associated with more positive self-esteem and self-concept. This association was moderated by various co-variates. Implicit theory scales which referenced the self were more strongly related to self-esteem and self-concept. Samples with higher proportions of males showed stronger effects. Future research should utilise experimental and longitudinal designs to demonstrate the direction of effect between implicit theories and self-esteem.

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Table 1

The link between incremental theories and self-esteem: moderation analysis

Moderator	k	n	<i>r</i> (95% CI)	<i>SE</i>	$R^2_{(2)}$	$R^2_{(3)}$	<i>p</i>
Baseline ($I^2_{(2;3)}$: 0.57; 0.34)	34	79	0.16 (0.12, 0.20)	0.02	-	-	-
Age	25	56	-	-	0.02	0.12	1.000
Gender	33	78	-	-	0.06	0.00	.035*
Mostly male	1	2	0.25 (0.02, 0.47)	0.12	-	-	-
Mixed gender	23	59	0.18 (0.13, 0.23)	0.03	-	-	-
Mostly female	12	17	0.13 (0.06, 0.20)	0.04	-	-	-
Education	27	63	-	-	0.00	0.02	1.000
GMS domain	34	79	-	-	0.00	0.67	.304
SE domain	34	79	-	-	0.00	0.31	.735
GMS type	34	79	-	-	0.54	0.00	.001*
Combined	15	27	0.16 (0.08, 0.23)	0.04	-	-	-
Entity (reversed)	18	35	0.13 (0.06, 0.19)	0.03	-	-	-
Incremental	9	17	0.27 (0.19, 0.34)	0.04	-	-	-
Matched domain	34	79	-	-	0.00	0.06	.279
Implicit theory frame	34	79	-	-	0.00	0.79	< .001*
Other	32	74	0.14 (0.10, 0.17)	0.02	-	-	-
Self	4	5	0.40 (0.27, 0.52)	0.06	-	-	-
Poor reliability	20	40	-	-	0.09	0.00	1.000
Publication decade	34	79	-	-	0.05	0.15	.061

Note. * $p < 0.05$; $I^2_{(2;3)}$ = Heterogeneity at level two and three, respectively; k = number of studies; n = numbers of effect sizes; r = pooled correlation; SE = standard error; $R^2_{(2)}$ = the proportion of within-cluster heterogeneity explained by the co-variate; $R^2_{(3)}$ = the proportion of between-cluster heterogeneity explained by the co variate; p = Likelihood ratio p-value

Figure 1. Prisma diagram of record extraction

Figure 2. Forest plot of the pearson correlation between incremental theories and self-esteem. Many studies had multiple effect sizes. In this figure, multiple effect sizes are indicated where multiple points and confidence intervals are present on a single row.

Figure 3. A funnel plot depicting the relationship of effect size and accuracy. Contours and shading depict density