Perspective matters: The internal/external frame of reference model for self- and peer ratings of achievement

Thomas Lösch [a], [*], [1], Augustin Kelava [b], Benjamin Nagengast [b], Ulrich Trautwein [b], Oliver Lüdtke [c], [d]

[a] LEAD Graduate School & Research Network, University of Tübingen, Germany
[b] Hector Research Institute of Education Sciences and Psychology, University of Tübingen, Germany
[c] Leibniz Institute for Mathematics and Science Education, Kiel, Germany
[d] Centre for International Student Assessment, Germany

ABSTRACT

The internal/external frame of reference (I/E) model posits that students' academic self-concept in one domain (e.g., math) is positively associated with achievement in the same domain but negatively associated with achievement in a comparison domain (e.g., English). Whereas academic self-concept encompasses self-ratings of achievement, peer academic reputation (PAR) encompasses peer ratings of the same achievement and PAR was shown to have an incremental predictive effect on a range of positive academic outcomes. Considering the importance of PAR, we hypothesized that the I/E model would also apply to PAR both as predictor and as outcome. We tested this hypothesis in a sample of 850 seventh-grade students in 47 classes in math and English. Therein, PAR was measured in a round-robin design where students rated each classmate's level of achievement. We tested I/E models with academic self-concept and PAR as outcomes. Results supported the I/E model for academic self-concept as outcome with academic achievement and PAR as predictor but not for PAR as outcome with achievement as predictor. For PAR as outcome, the effects across domains were positive rather than negative. These results were consistent across replications over three years using the same sample. Thus, whereas academic self-concept was characterized by contrasts between domains, PAR was characterized by assimilation between domains.

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1. Introduction

When students rate their achievement in a school subject (e.g., math), there are many possible comparison standards they can use. The *internal/external frame of reference model* (I/E model; Marsh, 1986) highlights the effect of dimensional comparisons between students' achievement in math and their achievement in a verbal subject (e.g., English). For instance, students who are better at math than English will have a more positive rating of their math achievement and, likewise, a more negative rating of their English achievement. There is ample empirical support for the I/E model

when it comes to self-ratings in the form of *academic self-concept* (Möller & Marsh, 2013; Möller, Müller-Kalthoff, Helm, Nagy, & Marsh, 2016; Möller, Pohlmann, Köller, & Marsh, 2009).

Whereas the I/E model is empirically well-supported when it comes to academic self-concept, it is unclear whether the I/E model also applies to peer-rated achievement, measured as *peer academic reputation* (PAR; Gest, Domitrovich, & Welsh, 2005). Thereby, students' PAR matters theoretically and empirically. Theoretically, PAR can be described as a precursor to self-perception (Wigfield & Eccles, 2000), and empirically, PAR has been found to be an important predictor of students' motivation, achievement, and—to some degree—their academic choices (Chen, Hughes, Liew, & Kwok, 2010; Denissen, Schönbrodt, van Zalk, Meeus, & van Aken, 2011; Gest et al., 2005; Gest, Rulison, Davidson, & Welsh, 2008; Hughes, Dyer, Luo, & Kwok, 2009). Thus, PAR is relevant to the I/E model in a twofold way. First, PAR might predict academic self-concept in a manner that is similar to achievement. Second, the I/E model has the potential to explain the formation of PAR. Yet, so

* Corresponding author. University of Bamberg, Markusplatz 3, 96047 Bamberg, Germany.
  E-mail address: thomas.loesch@uni-bamberg.de (T. Lösch).
[1] Thomas Lösch is now at the Department of Psychology, University of Bamberg, Germany.

far, the evidence is not conclusive (Möller, Helm, Müller-Kalthoff, Nagy, & Marsh, 2015).

In the present study, we tested whether and how the I/E model applies not only to self-rated but also to peer-rated achievement. We used a rigorous design to assess PAR, in which we used a sample of 850 seventh-grade students who rated not only themselves but also all their classmates with regard to achievement in English and math. In the resulting round-robin design, it is possible to control for idiosyncratic rating behaviors, which should allow for a reliable test of the I/E model for PAR.

1.1. The internal/external frame of reference model

The *internal/external frame of reference model* (I/E model) was first proposed with regard to the formation of academic self-concept (Marsh, 1986). Academic self-concept is referred to as one's self-perception of academic achievement in a specific domain or school subject (Marsh & Shavelson, 1985) and has been shown to be a very powerful construct as it is associated with several important outcomes. For instance, academic self-concept is predictive of academic choices (Parker et al., 2012), academic effort (Trautwein, Lüdtke, Schnyder, & Niggli, 2006), and academic achievement (Marsh & Craven, 2006).

The I/E model originally described two simultaneous processes in the formation of students' verbal and math self-concepts (see Fig. 1; Möller et al., 2009). In the I/E model, students' self-concept in English is positively associated with achievement in English. But when this association is controlled for, self-concept in English is negatively associated with achievement in math (with analogous results for math self-concept). This pattern of results was supported in Möller et al.'s (2009) meta-analysis, which included 69 studies with a combined sample of 125,308 participants. The associations in the I/E model result in a profile of perceived strengths and weaknesses with only weak correlations between self-concepts, although the correlations between corresponding achievement scores are moderate to high (Möller & Marsh, 2013).

Recently, findings regarding the I/E model were generalized in the *dimensional comparison theory* (DCT; Möller & Marsh, 2013). In the context of DCT, the I/E model was extended in two directions by applying it (a) to more than two domains and (b) to a broad range of domain-specific constructs.

First, according to DCT, the I/E model is the result of characteristics of academic domains. The multidimensional model of self-concept (Marsh & Shavelson, 1985) arranges academic domains on a continuum ranging from verbal to mathematical. Dimensional comparisons between domains that are farther apart on the continuum (e.g., math and English) should have stronger (contrast) effects than dimensional comparisons between domains that are closer (e.g., math and physics). One experiment (Helm, Mueller-
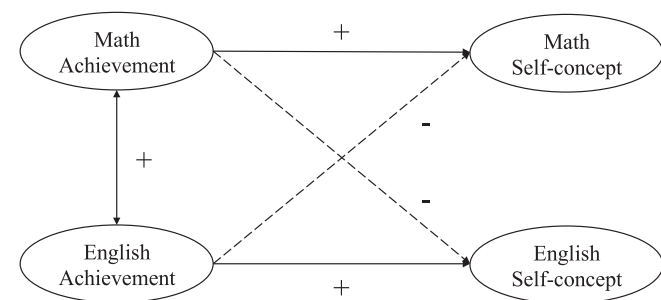
Kalthoff, Nagy, & Möller, 2016) and a number of observational studies have supported this reasoning and found no effects or even positive (assimilation) effects for near comparisons (Jansen, Schroeders, Lüdtke, & Marsh, 2015; Marsh et al., 2014; Marsh, Lüdtke, et al., 2015; Möller, Streblow, Pohlmann, & Köller, 2006; Xu et al., 2013). Similarly, students who believed in a negative correlation between mathematical and verbal abilities showed stronger contrast effects for dimensional comparisons between these domains (Möller, Streblow, & Pohlmann, 2006).

Second, at this point, the evidence suggests that the I/E model might apply to domain-specific ratings (in dissimilar domains) in general (Möller et al., 2016). So far, the I/E model has been applied to interest (Schurtz, Pfost, Nagengast, & Artelt, 2014), academic emotions (Goetz, Frenzel, Hall, & Pekrun, 2008), intrinsic motivation (Marsh, Abduljabbar, et al., 2015), and perceptions of the learning environment (Arens & Möller, 2016). In addition, intervention effects targeting motivation in one domain might have negative effects on motivation in a comparison domain (Gaspard et al., 2016). In a study on group perception, Yzerbyt, Kervyn, and Judd (2008) found results similar to the I/E model: Groups that were perceived as high in "warmth" were perceived as low in "competence" and vice versa (Möller et al., 2015). Finally, Helm, Abele, Müller-Kalthoff, and Möller (2017) found that self-ratings of agency and communion (the "Big Two," e.g.; Gebauer, Sedikides, Lüdtke, & Neberich, 2014) were predicted by peer ratings of agency and communion similar to the I/E model: Peer ratings of agency positively predicted self-ratings of agency, but they negatively predicted self-ratings of communion (and vice versa).

1.2. Peer ratings of achievement

Peer ratings of achievement and specifically *peer academic reputation* (PAR; Gest et al., 2005) are a relevant construct in educational psychology. James (1890) had already noted that how an individual is recognized by others represents an important part of the individual's self (termed the *social self*). A similar notion was put forward by Leary and Baumeister (2000), who described self-esteem as a reflection of how others value an individual. And finally, theories in educational psychology have proposed that significant others' ratings of a student shape that student's self-perception (Usher & Pajares, 2008; Wigfield & Eccles, 2000).

But moreover, studies on PAR have consistently shown that PAR predicts multiple indicators of positive academic development beyond and in addition to a positive self-perception. Gest et al. (2005, 2008) found that PAR was associated with academic achievement, effort, and general academic self-concept. It is important to note that they found that PAR predicted school grades over and above earlier grades over the course of several years (and similarly, that grades predicted PAR over and above earlier PAR). Similarly, Hughes et al. (2009) found that PAR predicted teacher-rated effort, teacher-rated achievement in math and reading, and performance on a reading test (but not on a math test) 1 year later, when prior values on all measures including prior achievement were controlled for. Chen et al. (2010) added to these results by finding that PAR predicted achievement on a standardized test 3 years later, when prior achievement, IQ, and economic status were controlled for. Therein, the effect of PAR on achievement was mediated by general academic self-concept and engagement. Finally, Denissen et al. (2011) found that PAR predicted and was predicted by grades on exams in a cross-lagged model in research on university students. Moreover, PAR predicted student dropout, whereas self-rated ability did not.

It is important to note that PAR needs to be distinguished from different forms of other ratings of achievement as demonstrated by

Fig. 1. The internal/external frame of reference model (I/E model) according to Möller et al. (2009). Achievement in one domain has a positive effect on self-concept in the same domain (+) but a negative effect on self-concept in the comparison domain (−).