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A Short Measure of Generalized Beliefs in One´s Own Performance, Social Support, and Good Luck

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A Short Measure of Generalized Beliefs in One's Own Performance, Social Support, and Good Luck

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Abstract

Individuals' decisions to engage in activities might not depend just on general self-efficacy, but also on whether one generally believes that external factors, i.e. powerful others or luck, will support one's effort to succeed. Although there are measurement instruments of general efficacy of self, others, and chance, there is no single instrument measuring all three in a short, consistent, and comparable way. Therefore, this study develops a three-dimensional 12-item scale. General self-efficacy dimension is complemented by four items measuring general better-than-others beliefs, which previously has shown to be a relevant distinction. The study is based on 6 different samples with 863 subjects. Results of a correlation analysis of efficacy beliefs with dispositional optimism, risk-taking, information search behavior, and entrepreneurial attitudes illustrate the potential benefits of distinguishing the different types of general efficacy beliefs.

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1 INTRODUCTION

Optimism and thus beliefs about being successful and achieving one's desired outcomes influence decision makers across a variety of contexts (Peterson, 2000). Success, however, frequently depends on a variety of factors not only including one' own ability to perform required actions, but also external factors as others' help and good luck. While general self-efficacy as an expectation about one's own performance in a variety of context, has been used to explain people's outcome expectancies (see Bandura 1997) and decision-making processes (Kolvoreid, Krueger et al. 2000), complementary general evaluations of external factors have received less attention. Among those are Judge et al. (1997, 1998) followed Packer (1985) in considered bottom-line conclusions not only about self, but also about other people, chance, and nature. Literature on social support frequently focused on general beliefs about others' support (e.g., Karademas, 2006), while other studies focused only on beliefs about good luck (e.g., Day and Maltby 2003).

Previous studies simultaneously investigating general beliefs about one's own efficacy and about the efficacy of others and chance utilized rather heterogeneous measurement instruments (e.g., Judge et al., 1998, Karademas, 2006, Simon et al., 2000). The measurement instruments differ with respect to their level of abstraction, e.g., more or less context-specific, but also with respect to the conceptualization of the fundamental nature of these constructs, e.g., as evaluations or as worldviews (for the distinction worldview versus evaluation see Chen et al. 2004) or with respect to differentiation to control beliefs and outcome expectancies, distinctions considered as important by Bandura (1997) and also by Skinner et al. (1988).

To shed new light on the role of general beliefs about the efficacy of external factors and

to investigate these beliefs at an equivalent level as general self-efficacy, this article develops a scale system that addresses efficacy beliefs regarding internal as well as other people and chance as external factors at the same level of abstraction and operationalized in ways comparable to general self-efficacy. The new scale system distinguishes between self-efficacy, other-efficacy representing perceived instrumental social support, and chance-efficacy, a belief in good luck given that luck matters. This new scale system enables researchers to better understand dispositional antecedents of outcome expectancies; it allows understanding dispositional optimism with respect to three fundamentally different areas of one's life. To illustrate the potential use and benefits of the suggested scale system, the last part of this study investigates the subscales' correlations with dispositional optimism, curiosity and the related behavior of voluntary information broking, self-reported risk taking, and entrepreneurial attitudes. The results illustrate the benefits of considering these three types of efficacy beliefs simultaneously.

The study proceeds as follows. Section 2 discusses three types of efficacy beliefs as well as relative self-efficacy, which is a better-than-others belief and closely related to self-efficacy. Section 3 briefly presents the general procedure and the participants of all samples used throughout this study. Section 4 tests whether the three types of general efficacy beliefs can be distinguished. Section 5 reports the iterative process to improve the initial item set to create a scale system with sufficiently good psychometric properties. Section 6 reports a correlation analysis of the different types of efficacy beliefs with other variables of interest including dispositional optimism, risk-taking, information search behavior, and entrepreneurial attitudes.

2 GENERAL BELIEFS ABOUT THREE GENERIC SOURCES OF SUCCESS

Literature on locus of control, which describes a person's belief about what affects one's outcomes in life, suggests three general factors that one's outcomes depend on: oneself, powerful

others, and chance (Rotter, 1966, Levenson, 1974). This three-dimensionality parallels the three-dimensional core evaluation approach suggested by Judge et al. (1997) and Packer (1985), which itself builds on Rokeach's (1972) belief system comprising a person's beliefs about the self, the social world, and the physical world. While locus of control refers to perceptions of the degree to which specific factor influence outcomes (Rotter 1966), core evaluations refer to appraisals of factors that are fundamental and wide in scope (Judge et al., 1997). Generalizing Bandura's (1997) and Judge et al.'s (1997) definitions of specific respectively general self-efficacy, we define *efficacy beliefs* as the expectancy that a particular antecedent will be helpful or useful in creating a favorable outcome; self-efficacy refers to one of the generic antecedents. Efficacy beliefs are distinct from *outcome expectancies*, which are expectancies that a particular positive outcome will occur. Efficacy beliefs are also different from *control beliefs* describing the extent to which a specific factor influences one's outcomes (Bandura, 1997). The focus of this study is on *efficacy beliefs*.

Efficacy (and control) beliefs can be conceptualized at a context-specific level as for instance advocated by Bandura (1997) for self-efficacy and by Spector (1988) for locus of control with respect to the workplace, but also at a very general, fundamental level as it was for instance done by Judge et al. (1997), Chen et al. (2001), Chen et al. (2004), and Schwarzer and Jerusalem (1995) for efficacy beliefs and by Rotter (1966), Levenson (1974), and Judge et al. (1997) for locus of control. Especially for self-efficacy there is an ongoing discussion about the relevance of generalized self-efficacy in comparison to self-efficacy beliefs specific to a context (see Bandura, 1997; Judge et al. 2002). Empirical research, however, has demonstrated its relevance (Judge et al., 1998, 2002; Chen et al., 2001; Schweizer and Koch, 2001). For instance, Judge et al. (1998, 2001, 2002) find that general self-efficacy affects job attitudes and Chen et al.

(2001, 2004) show that generalized self-efficacy affects task performance. This study considers *generalized efficacy beliefs* about the self, others, and chance.

Despite generalizing across contexts the focus of this study is on self-evaluation, which is distinguished from worldviews. In contrast to self-evaluations, worldviews are personal beliefs about the majority or all people within an organization instead of being about the self only (Chen et al., 2004). For example, when measuring external core evaluations Judge et al. (1998) elicit world-views, e.g. "Most people will tell a lie if they can gain by it" and "Man is doomed to tragedy and despair in life". While such beliefs may be important drivers in many situations, this study focuses on evaluations which refer to beliefs whether or not an antecedent of one's outcomes will work in favor of one's own goals.

2.1 General self-efficacy

A person's general self-efficacy is the self-perception of one's ability to perform well across a variety of different situations (Judge et al. 1998). Self-efficacy and similar competence-related beliefs have been frequently investigated in management and economic research (e.g., Gist and Mitchell, 1992; Logan and Ganster, 2007). Such beliefs are relevant across many economic settings; for instance in entrepreneurship (Chen et al. 1998; Krueger, 2003; Shane, Locke, Collins, 2003, Zhao et al. 2005, Townsend et al, 2008) and in research on work stress, job performance, and job attitudes (Judge et al., 1997, 1998, Schaubroeck and Merritt, 1997). The empirical relevance of self-efficacy and particularly general self-efficacy is also supported by the substantial effort put into developing appropriate measurement instruments (e.g., Schwarzer and Jerusalem, 1995; Judge et al., 1998; Chen et al., 2001; Schweizer and Koch, 2001, Sherer et al., 1982).Among the scales developed for general self-efficacy, the New Generalized Self-Efficacy (NGSE) scale developed by Chen et al. (2001) has shown slight advantages over similar scales

(Scherbaum, Cohen-Charash, and Kern, 2006). While the wide acceptance of the relevance of self-efficacy may suggest a well-developed widely agreed theoretical basis, there are a few issues that are either ambiguous or still under discussion; three will be discussed here and in the next subsection.

While Bandura (1997) explicitly distinguishes self-efficacy from control beliefs as well as from outcome expectancies recent research on general self-efficacy has not explicitly considered or has even challenged these distinctions. While the difference between self-efficacy and locus of control has been thoroughly discussed with respect to perceived behavioral control in the literature on attitudes and intention (Ajzen, 2002), it has not been considered in applied research on managerial and entrepreneurial decision-making (e.g. Kolvereid and Isaksen, 2006). While Bandura (1997) working on context-specific beliefs explicitly distinguishes self-efficacy from self-esteem and locus of control, other researchers, like Judge et al. (1997), argue that for dispositional variables self-efficacy and locus of control are indicators of the same fundamental trait, including self-efficacy, locus of control, as well as self-esteem and neuroticism (Judge et al. 1998, 2000, 2001, 2002). However, Judge et al. (2002) explicitly call for further research on the relation of locus of control with other constructs covered by their core evaluations because locus of control shows weak measurement characteristics and also shows weaker correlations with the core evaluation construct. As a consequence and to simplify further studies on relations between control beliefs and efficacy beliefs, this study aims at distinguishing general efficacy beliefs from locus of control.

Besides the self-efficacy versus locus of control discussion, the distinction between self-efficacy and outcome expectancies, which is emphasized by Bandura (1997:23), has not received much attention. The fact that one is able to perform all actions required does not necessarily

imply that one will achieve good outcomes. When outcomes depend on factors beyond one's control, having favorable expectations about one's performance does not need to translate into favorable outcome expectancies. That this difference is not acknowledged in empirical research becomes obvious when considering two items from the widely used New General Self-Efficacy Scale (Chen et al., 2001). The item "I am confident that I can perform effectively on many different tasks" is almost perfectly in line with Bandura's (1997) definition of self-efficacy. However, the item "In general, I think that I can obtain outcomes that are important to me" clearly refers to outcome expectancies that may or may not depend on one's own performance. Given Bandura's (1997) theory and his empirical justification, measurement instruments of self-efficacy beliefs should therefore either not refer to outcomes but only to one's own contribution to outcomes or refer to a situation where outcomes only depend on one's own performance, which makes the self-efficacy belief a perfect correlate of outcome expectancy.

2.2 General relative self-efficacy or the three-and-a-half dimension approach

Among the eight items of the New General Self-efficacy scale developed by Chen at al. (2001) there is one item calling for further attention. The item "Compared to other people, I can do most tasks very well" refers to one's performance relative to other people, while all other items do not refer to such comparative judgments. Further, among the more specific self-efficacy measurement instruments present in economic and management literature one also finds scales referring to comparative judgments (e.g., Wilson et al. 2007) and those not referring to them (e.g., Chen et al. 1998). Should such comparative beliefs be distinguished from more self-centered beliefs about one's own performance?

There are empirical, psychometric, and theoretical reasons, why a distinction seems plausible. First, according to recent empirical results, beliefs that one is better than others can in

fact be psychometrically distinguished from absolute performance beliefs (Vautier and Bonnefon, 2008). Second, both self-efficacy and relative self-efficacy can be justified as individually relevant, it just depends on the degree of competition and the prevalence of social comparison (see Moore and Healy, 2007, 2008). Grieco and Hogarth (2009) empirically show that people's judgments regarding their performance and relative performance are subject to different biases, suggesting that both types of judgments need to be distinguished empirically. Furthermore, better-than-others beliefs have received substantial attention in economic research, for instance, Köllinger et al. (2007). Given the recent empirical and theoretical evidence, it is useful to test, whether self-efficacy needs to be distinguished from relative self-efficacy. Therefore, despite focusing on a three-dimensional conceptualization of efficacy beliefs, i.e. self, others, and chance, this study acknowledges the potential economic relevance of comparative self-efficacy beliefs and thus complements the self-efficacy dimension with a *relative self-efficacy* dimension.

2.3 General other-efficacy

Besides self-efficacy, beliefs about other people and especially beliefs about their support have received substantial attention in management and in psychological research. Perceived social support can be broadly defined as the availability of help in times of need from supervisors, coworkers, family members, and friends (Rahim, 1997). Support for the relevance of rather general beliefs about other people is provided by O'Driscol and Randall (1999), who report that perceived organizational support affects job involvement. House (1981) as well as Karasek and Theorell (1990) report that social support positively affects workers' physical and mental health. Kanner et al. (1978) report that social support reduces strain, including burnout. Doeglas et al.'s (1996) results support the fact that perceived social support affects human behavior and judgments. Karademas (2006) reports that perceived social support positively

correlates with dispositional optimism.

Recent research on efficacy beliefs has emphasized the role of *collective efficacy*, which is defined by Bandura (1997) and Fernández-Ballesteros, Díez-Nicolás, Caprara, Barbaranelli, & Bandura (2002) as "a group's shared belief in its conjoint capabilities to organize and execute the courses of action required to produce given levels of attainments." Schaubroeck et al. (2000), however, consider beliefs on collective efficacy to be individual beliefs, which is comparable to the conceptualization of self-efficacy beliefs. Zellar et al. (2001) report that collective efficacy is particularly relevant in nursing environments, since fulfilling the requirements of the job is inherently dependent on the coordination of group activities (see also van Yperen & Hagedoorn, 2003). Further, Schaubroeck et al. (2000) find in collectivistic countries that self-efficacy matters less and is to some extent replaced by collective efficacy. Both studies show that collective efficacy influences job satisfaction and turnover intentions even while controlling for self-efficacy, which provides further support for the relevance of other-regarding efficacy beliefs.

Suurmeijer et al. (1995) distinguishes a social-emotional type (e.g. affection, sympathy or companionship) from an instrumental type of social support (e.g. advice, practical help or financial aid). The distinction between these two types of social support roughly mirrors the distinction of self-esteem, which refers to people's appraisals of themselves (Judge et al., 1997), and self-efficacy discussed above. As this study's goal is to complement general self-efficacy, the focus is on instrumental social support. To make the complementary nature even more explicit we label perceived instrumental social support as *other-efficacy* and define it as a person's self-perception of other people's willingness to help to achieve one's favored outcomes across a variety of different situations.

2.4 General chance-efficacy

Beliefs about one's own performance are important for the formation of outcome expectancies, but less important if one's outcomes depend less one one's own performance and instead on other people or chance (Bandura, 1997). Judge et al. (1997, 1998) are to our knowledge among the first to address explicitly general 'external core evaluations' as a complement to 'core self-evaluations' that include self-efficacy. As mentioned above, the external core evaluations include trust, beliefs in a benevolent and just world, but they also capture beliefs about possibilities to become happy. Judge et al. (1998) recognized that there was no measurement instrument available and thus they created their own one, which includes items like "It is possible to attain happiness in this world" and "Man is doomed to tragedy and despair in life". While these beliefs may serve well the purpose of measuring an external core evaluation, this study aims at distinguishing external factors with respect to other people and chance and also aims at conceptualizing external efficacy beliefs at an equivalent level as general self-efficacy. For that purpose we define chance-efficacy as a person's self-perception of that fact that good luck will help to achieve one's favored outcomes across a variety of different situations.

There is one construct closely related to chance-efficacy as defined above, i.e. the Belief-in-Good-Luck scale by Darke and Freedman (1997). People holding a strong belief in good luck are defined as those who believe that luck plays a major role in life, e.g. "Luck plays and important part in everyone's life", and believe that they will be lucky, e.g. "I consider myself to be a lucky person". Maltby et al. (2008) reports that this scale consist of two times two factors[1]: two for positively and negatively worded beliefs about whether one is lucky and two for

[1] The fact that for both dimensions Maltby et al. find two factors distinguished by the framing (positive versus negative) of the corresponding items could be an example of what Spector et al. (1997) call artificial factors resulting from a response biases specific to positive or negative items. For dispositional optimism this has been empirically supported by Rauch et al. (2007).

positively and negatively worded beliefs about whether luck matters. While the former two factors correlated substantially with optimism but not with internal locus of control, the latter two correlate significantly negative with internal locus of control but not with optimism. Maltby et al.'s results clearly suggest that the belief in good-luck scale consists of an efficacy and a control part. While these results strongly suggest distinguishing efficacy from control beliefs, it also provides substantial support for the relevance of chance-efficacy for the formation of outcome expectancies like dispositional optimism.

3 PARTICIPANTS AND PROCEDURE

Within this study that aims at developing a three-dimensional scale for measuring beliefs regarding self-, other-, and chance-efficacy, several distinct samples of participants were used. The samples were collected in two lectures at the school of business and economics at a large German university. In one of these two lectures the survey was distributed and filled out at the beginning and in the other one at the end. The summary statistics for both lectures are reported in Table 1 under the label "Sample 1". For the other samples used in this study surveys were distributed in four lectures at another large German university (samples 2, 3, and 4). In these lectures, the survey was completed during the first 15 to 20 minutes of the lecture. Within each of all of these lectures, we randomly distributed 3 gifts with values between 5 and 30 Euro among all returned surveys. Table 1 provides some descriptive statistics on gender, age, and duration of students' study. Throughout this paper, the labels provided in the first column of Table 1 are used to refer to the corresponding sample. Note that for reasons discussed later on, sample 4 is randomly split and referred to as subsamples 4_1 respectively 4_2. Note further that some respondents did not answer all items; they were excluded as necessary.

Table 1
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4 STEP 1: DISTINCTIONS OF THREE TYPES OF EFFICACY BELIEFS

This study first tests whether or not the three (self, others, and chance) respectively four types of efficacy beliefs (including relative self-efficacy) can be distinguished. To accomplish this, the analysis is split into two parts: (1) Identification of items that provide a one-dimensional measurement of each of the dimensions, and (2) a confirmatory factor analysis that tests the three-dimensional nature. Note that the first part does not aim at selecting items that distinguish the efficacy dimensions well.

4.1 Sampling items

To measure general self-efficacy items of the New General Self-efficacy Scale developed by Chen et al. (2001) were included, because this scale has shown slight advantages over similar scales (Scherbaum, Cohen-Charash, and Kern, 2006). Because some of the NGSE items refer to outcome expectancies and some others to performance expectancies, one item is included that explicitly and unambiguously refers to performance expectancies as defined by Bandura (1997), i.e. “If it only depends on my abilities, then I will be successful”. Further, as the NGSE scale includes a single item on relative self-efficacy, four additional items are samples that relate to rivals and competitive behavior, e.g. “I am typically pessimistic when I evaluate my success chances in competitions”. These items are considered to form the factor relative self-efficacy and they will be used to test whether relative self-efficacy forms a separate factor, which can be easier tested with more than a single item.

For other-efficacy we include nine items. Some focus on general expectancies of social support, e.g. “Other people have my best interest at heart” and “In general, I expect that more people will support than hinder me”. Other items refer to trust under extreme conditions, e.g.

"One can never rely on deals with rivals", or to attitudes towards group work like "Working with others is always a gain".

For chance-efficacy we include items of the revised life-orientation test (LOT-R) developed by Scheier et al. (1994). While these items do not explicitly refer to self-efficacy or social support, these items should be related to chance-efficacy, too. However, additional four items are generated that focus more on chance and luck, such as "When my success depends on luck, then I often do better than others would expect". Having both, the life-orientation items as general outcome expectancies, as well as items referring to more specific optimism on chance events, enables us to make sure that we focus on the chance-efficacy dimension and do not drift to much towards general outcome expectancies.[2]

Self-efficacy and relative self-efficacy, other-efficacy, and chance-efficacy are altogether represented by 32 items. All items related to these four dimensions have labels containing an 'S', indicating self-efficacy, an 'R' indicating relative self-efficacy, an 'O' indicating other-efficacy, or a 'C' indicating chance-efficacy, and a number indicating the specific item.[3] Besides these items, the social optimism scale by Schweizer and Koch (2001) was included additionally. These additional 24 items do not address personal optimism but only address general social optimism at the societal depersonalized level, e.g. "Living conditions will change for the worse". It reflects a class of measurements related to depersonalized optimism or worldviews that has been used by Wally and Baum (1994)[4] for strategic decision making and by Simon et al. (2000) for evaluation of business opportunities. Wally and Baum and Simon et al., however, report that these

[2] When this study started, I was not aware of the rarely used scale by Darke and Feedman (1997), such that these items were not used in this study.
[3] The labels are structured such that items can be easily found in tables; the numerical part of labels does not represent the position of an item within the survey.
[4] These authors measured general optimism by three items: "I feel the economy will expand next year", "I usually expect improvement in my life and the economy", and "I fell my performance will improve next year".

worldviews are not related to personal expectations. Including a large number of such items makes the focus on the personal evaluation level less obvious while at the same time it allows determining if personal and depersonalized expectations can be distinguished with respect to the other-efficacy dimension. Additional 10 items were included for exploratory reasons. Among these items there are four items suggested by Haghighat (2007) for measuring social desirability[5], an additional item for social desirability, and five items that might be related to the three dimensions but either mix them, e.g. “Support does not hurt, but I never depend on it” or are less focused, e.g. “Nothing ventured, nothing gained”.

All 66 items were randomized and presented on three pages with 20 to 25 items on each page. Note that mixing all items implies that established scales like LOT-R and NGSE are spread across the whole set of related items, which differs from many other applications of these scales and provides a challenge to the internal reliability of these scales. The survey was titled “Your view to the world in 66 statements”. We used German translations and the responses are on 7-point Likert scales ranging from “fully agree” to “completely disagree”. For this first exploratory study we used sample 1.

4.2 Results: Item selection

First, appropriate sets of items are selected such that the dimensions can each be considered as one-dimensional. To ensure a sufficiently large sample size per item ratio above 10 (see Hair et al., 2006) and to avoid item selection that favors the distinction between dimensions, we start with dimension-specific factor analyses. Because the goal is to identify latent constructs that are based on theoretical considerations and one might expect that the constructs are correlated, common factor analyses with oblique rotation are used (Hair et al. 2006). Item

[5] Due to size restrictions I did not include the more established but nevertheless much longer scale by Crowne and Marlowe (1964).

selection for sum scores is based on the pattern matrix, because it reveals the unique contribution of an item to a factor excluding the between-factor correlations (Hair et al. 2006). Nevertheless, to avoid obscure groupings of variables the factor structure matrix is reported, which gives the full correlation of variables with factors (Nunnally and Bernstein, 1994). All exploratory factor analyses reported in this study have been performed with SPSS (version 12).

For the *self-efficacy* dimension the factor analysis yields two factors with eigenvalues above one, one with 4.237 and a second one with 1.059 that just exceeds the threshold of one. After rotation (reported in Appendix A), these two factors can be distinguished by looking at those items that have large unique loadings on one and small unique loadings on the other factor. The additionally created item S08 has a large unique loading on the first but no unique loading on the second factor. Items S02 and S07 that both are part of NGSE have large unique loadings on the second but no unique loading on the first factor. The latter two items refer to the perception that one will achieve goals and obtain outcomes relevant for oneself, while the former item refers to performance expectations independent of final outcomes. Aiming at distinguishing self-efficacy beliefs from outcome expectancies, the first factor is most appropriate to represent self-efficacy. With one exception, I select those items with largest unique factor loadings on factor one to mirror generalized self-efficacy, i.e. S01, S05, S06 from NGSE and the additional item S08. To avoid confounding self-efficacy with relative self-efficacy, despite loading well on factor one item from the original NGSE scale (R04) is not selected.

The factor analysis for *other-efficacy*, i.e. the perceived instrumental social support, reveals three factors with eigenvalues above one (2.493, 1.475, and 1.003). Due to the small eigenvalue of the third factor, which just marginally exceeds one, and considering the scree plot as well as due to finding a factor structure easier to interpret, only two factors are extracted. The

weaker factor refers to attitudes toward group work, e.g. “When I work together with others, it is always a benefit”, whereas the other stronger factors clearly refers to perceived social support, i.e. other-efficacy. For other-efficacy those items are selected that have the largest unique factor loadings on factor one, i.e. O01, O02 O03, and O04.

The factor analysis on the items sampled for measuring expectations regarding those factors that are not under one’s own or other people’s control, i.e. *chance-efficacy*, results in three factors with eigenvalues above one (3.415, 1.199, and 1.117). The first factor clearly refers to general optimism. It collects positively coded items from LOT-R and two positively coded and more generally worded additional items. Factor two is interesting because it clusters around two items that focus much more on luck than on general optimism. The distinction of factor one and two indicates that chance expectancies differ from general outcome expectancies. The third factor seems to indicate pessimism as the two items with largest loadings that at the same time do not load on other factors are negatively worded items of the life-orientation test.[6] For measuring expectancies regarding chance events I can only select the three items representing the second factor, i.e. C06, C07, and C08, because these items have a narrower focus on luck and are distinguished from the more generally worded items.

For exploratory reasons also items regarding *relative self-efficacy*, including rivalry and competition, are considered as a distinguished dimension. The factor analysis yields two factors

[6] The factor structure found for the items that belong to the life-orientation test deserves an additional discussion. The analysis suggests that positively and negatively worded items of LOT-R load on different factors, which is consistent with previous studies, e.g. Scheier et al. (1994) and Rauch et al. (2007). Spector et al. (1997) discuss such bipolar structure as artificial factors resulting from specific response patterns. Recently it was suggested that positively worded items of LOT-R correlated positively with social desirability and that the negative items are less susceptible to that (Vautier et al., 2003; Rauch et al. 2007). And indeed, testing correlation of social desirability with sum scores of all items of LOT-R (r=0.103, p=0.179), with positive items only (r=.192, p=0.012), and negative items only (r=-0.007, p=0.931) supports this hypothesis. One should therefore expect that scales with only positively or only negatively worded items show better factor structures. This is especially relevant when closely related constructs are measured based on short scales with just a few items.

with eigenvalues above one (2.212 and 1.187). The first factor refers to beliefs about the effects of competition, i.e. “It always hurts if I have competition” and “Competition makes me getting better”. The three items loading on the second factor (R01, R03, and R04), e.g. “When evaluating my chances for success in a competition with others, I tend to be pessimistic”, represent a relative performance expectation. These three items are kept as *relative self-efficacy*.[7]

4.3 Results: Confirmatory test for independence of efficacy beliefs

Based on the four one-dimensional scales, it can now be tested whether the identified sets of items form a sufficiently good multi-dimensional scale system. For this purpose a *confirmatory factor analyses* (CFA) is run based on all selected items: one CFA with the three core dimensions only, one where relative self-efficacy is included as a distinguished fourth factor, and a third one where relative self-efficacy items are pooled with self-efficacy items into a single factor. To avoid any bias (and to allow the computation of the Standardized Root Mean Residual, SRMS) all participants who did not answer all items required for the analysis were excluded. All confirmatory factor analyses, including those reported later on, were run in AMOS (version 6). In Table 2, where the CFA results are reported (Model I on sample 1), one observes that the three-dimensional model fits data very well (CFI>0.95, RSMEA<0.06, and SRMR<0.08, which represent the very conservative limits for evaluating fit indices as suggested by Hair et al., 2006, p. 753).

Other-efficacy and chance-efficacy have a large estimated correlation (standardized covariance), i.e. 0.705. Therefore, a two-factor model is tested where these two dimensions are combined into a single factor (not reported in Table 2). It does not fit well and substantially worse than the three-factor model, i.e. CFI=0.82, RSMEA=0.103, SRMR=0.104.

[7] Note that if one mixes these two factors, then one could in principal develop a factor that is easily distinguished from self-efficacy (as it was done in an earlier version of this paper). However, the resulting factor would not anymore be focused on relative performance expectations but include attitudes towards competition in general.

A four-dimensional model that includes items on relative self-efficacy as a distinguished factor fits not as good as the model without relative self-efficacy, i.e. CFI falls below 0.95, but RSMEA and SRMR indicate a good fit. The estimated correlation (standardized covariance) between self-efficacy and relative self-efficacy is 0.9 and is thus rather large. However, the model where self-efficacy and relative self-efficacy represent the same factor is neither significantly better nor worse with respect to fit indices (see Table 2).

The internal reliability measured by Cronbach's α is also reported in Table 2; it indicates that the self-efficacy subscale is reliable (α=0.704) and other-efficacy and relative self-efficacy subscales can be used for exploratory research (α=0.650 and α=0.633), but the chance-efficacy subscale is rather weak with α=0.593. Estimated correlations within the CFA and correlations of the sum scores are intuitive: There is a very large dependency between self-efficacy and relative self-efficacy and the correlation between other-efficacy and chance-efficacy, i.e. between the two external factors of outcomes, are larger than the correlation between internal and external factors.

Results: Selected tests of discriminatory validation

As an additional validity check, we test correlations between efficacy beliefs and social optimism at the societal level (SOSL, α=0.860, N=162) and efficacy beliefs and dispositional optimism (LOT-R, α=0.662, N=174). All four efficacy measures correlate weakly with SOSL, i.e. $r_{S,SOSL}$=.200, $r_{R,SOSL}$=.302, $r_{C,SOSL}$=.264, and $r_{O,SOSL}$ =.207. Also the New General Self-efficacy scale (NGSE, α=0.845, N=173) and dispositional optimism measured by the life-orientation test correlate weakly but significantly with dispositional optimism ($r_{LOT\text{-}R,SOSL}$=0.331 and $r_{NGSE,SOSL}$=0.215). Our results are consistent with Schweizer and Koch (2001) who report a correlation of 0.2 between self-efficacy optimism (not measured with NGSE but with an alternative measurement) and SOSL. All person-oriented measures correlate less than 0.35 with

the depersonalized society-level social optimism. Schweizer and Koch (2001) find a correlation of 0.51 between dispositional optimism and self-efficacy, which is replicated by our data where there is a correlation of 0.470 between self-efficacy and dispositional optimism and 0.532 between NGSE and dispositional optimism.

To summarize, the results indicate that the three dimensions, i.e. self-efficacy, other-efficacy, and chance-efficacy, can be distinguished. Our data, which shows correlations that are consistent with previous research, also shows that personal expectancies are more correlated with personal dispositional optimism than with depersonalized social optimism. This especially holds for other-efficacy, which is a sort of personal social optimism. Regarding the distinction of self-efficacy and relative self-efficacy there is no definite conclusion. The study now proceeds to refine the scale system to improve the psychometric properties.

Table 2

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5 STEP 2: TEST, REVISE, TEST, REVISE, AND TEST

After the first step of this study has established that the three types of efficacy beliefs can psychometrically be distinguished, the second step aims at testing and further developing a set of items that forms a scale system with sound psychometric properties. Confirmatory factor analyses are used to test factor structures on new distinct samples (samples 2, 3, and 4). Additional items are included to potentially replace existing ones. This step of the study includes multiple rounds of creating and testing new items.

5.1 Design

For all these rounds, the items selected so far were mixed and additional items were sampled. In the first round new items were samples for relative self-efficacy, for chance-efficacy,

and based on Doeglas et al. (1996) for other-efficacy. In the second round new items were generated only for chance efficacy. After collecting demographic data on gender, age, mother tongue, subject of study, and progress of study, the newly developed scale system was the first block of items followed by newly sampled items and items of other scales (which are explained later on because they differ between samples).

5.2 Results

A confirmatory factor analysis of the model derived in the first step was run on the second sample (see Table 2). While for the three factor model, the CFA shows a very good fit, the four factor model shows a weaker fit. The results are similar to those in the first study; especially we find that the internal reliabilities of subscales are weak. As a next step, subscales except self-efficacy were revised based on subscale-specific correlation and factor analyses. Items were selected similarly as in the first step. The full set of analyses is not reported here, but only the confirmatory factory analysis of the resulting model (model 2). The fit indices indicate a good fit for the three-factor model and a rather good fit for the four-factor model. Self-efficacy and other-efficacy show a good internal reliability ($\alpha>0.7$) and chance-efficacy and relative-self-efficacy are at a level acceptable for exploratory research ($\alpha>0.65$). The revised item set is then tested on the third sample. The fit indices drop substantially. While the three-factor model still seems appropriate, the four-factor model does not show a CFI above a level that is usually considered an acceptable level, i.e. CFI<0.9. The internal reliability of the chance optimism subscale drops substantially and is unacceptably low ($\alpha=0.491$). The weakest item is the only negatively worded item in the three-dimensional scale system. The refinement of the scale was iterated another round. Sample four was split into a smaller sample 4_1 (N=50) used to refine the chance optimism subscale and a larger sample 4_2 (N=214) to test the refined scale system. I

selected four items based on exploratory factor analyses. The CFA on the small sub sample is reported in Table 2. The new revised model III was then tested with a confirmatory factor analysis on the second larger sub sample 4_2. The results of these final CFA are visualized in Figure 1. As can be seen in Table 2, all fit indices meet the most conservative levels reported by Hair et al. (2006) and Cronbach's alphas of the three most important subscales (S, O, C) are all way above 0.7 indicating a sufficiently internal reliability. For relative self-efficacy the internal reliability of 0.696 is also sufficiently high. A test of a model where relative self-efficacy and self-efficacy mirror the same latent construct shows slightly better fit indices than the model where these two factors are separated. An additional exploratory analysis is also done for the all 16 items. There are four factors with eigenvalues above one (Appendix B reports a three and a four factor solution). While the items for the three major dimensions load separately, the relative self-efficacy items load on self-efficacy, too. Note, however, that items of self-efficacy do not show substantial cross loading on the relative self-efficacy factor.

Figure 1

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6 STEP 4: CORRELATIONS – PREDICTIVE VALIDITY

While this study so far has shown that the three dimensions can be distinguished and provides a set of items to measure the three types of efficacy beliefs at a comparable level, we now report the efficacy beliefs' correlations with other variables to illustrate predictive validity of the scale system. In sample 4 we measured constructs that are either related to outcome expectancies and its antecedents, i.e. control beliefs, dispositional optimism, and self-reported risk-taking, or related to a specific type of risk-taking, i.e. attitudes and intentions regarding entrepreneurship, or relate to information search and broking behavior which we believe are

affected by self-efficacy beliefs, i.e. curiosity and voluntary information broking.

6.1 Measurements

At the end of the survey distributed in samples 3 and 4 additional blocks of measurements were included, i.e. the IPC scale by Levenson (1974) to measure the beliefs that life is determined by self, powerful others, or chance and providing a subscale for each dimension, the Curiosity and Exploration Inventory by Kashdan et al. (2004), the Tertius Iungens Orientation by Obstfeld (2005) to measure voluntary information broking, single items related to self-reported risk-taking related to risk-taking in general, with respect to financial investments, related to career issues, and related to gaming and playing (Dohmen et al. 2005, Bonin et al., 2007, Bonin et al., 2008), and items related to entrepreneurial intentions, which were inspired by Krueger et al. (2000), asking for how attractive participants find to start their own business or to get self-employed as well as asking for the probability that participants will start their own business or get self-employed within the next year after finishing their study, within five years, or sometimes in the future. The original IPC scale was only included in approximately half of the survey, the others included a variation of it, which is not analyzed here. The first columns in Table 3 report the summary statistics (mean and standard deviation) and where appropriate Cronbach's alpha as a measure for internal reliability of the corresponding measurement instrument.

6.2 Results

The columns in the middle part of Table 3 report the Pearson correlations of the variables of interest with the three types of efficacy beliefs. For self-, other-, and chance-efficacy Table 3 additionally reports the partial correlations controlling for the remaining two dimensions. For some variables, e.g. risk-taking or entrepreneurial intent, one gain more insight if one additionally controls for a fourth variable, e.g. dispositional optimism or attractiveness of entrepreneurship. The motivation for this is discussed jointly with the results. The last two

columns of Table 3 answer the question whether relative self-efficacy plays a role above and beyond self-efficacy and the three generic efficacy beliefs. The two columns report correlations with relative self-efficacy and the partial correlations controlling for the other three types of efficacy including self-efficacy.

Table 3

For *dispositional optimisms* we find that all dimensions including relative self-efficacy have their own unique contribution. This indicates that dispositional optimism is indeed a generalized expectancy related not only to all three major types of efficacy beliefs but also to relative self-efficacy. Each correlation is consistent with existing literature (e.g., Bryant and Cvengros, 2004, and Karademas 2006, Maltby et al. 2008), it is however the first time that all were tested at the same time.

Consistent with existing studies (e.g., Judge et al. 1998), we find that self-efficacy is positively correlated with *internal locus of control*. However, while Levenson's subscale on internal control substantially correlates with self-efficacy, self-efficacy does not negatively correlate with perceived control by others or by chance. While the original conceptualization of locus of control by Rotter (1966) assumes that a smaller internal is compensated with a larger external locus of control, one should expect complementary correlations. Further research should clarify if this effect is robust and if it is robust, then why these complementary correlations are not found. Note further, that despite there is a relatively large correlation between relative self-efficacy and internal control beliefs, this correlation disappears (in contrast to other variables reported below) once controlled for self-efficacy. This for internal locus of control relative self-efficacy has no unique contribution above and beyond self-efficacy. We also find that chance-efficacy and perceived control by chance are positively correlated, which is consistent with

Maltby et al. (2008).

Wally and Baum (1994) explicitly link risk tolerance with optimism; more optimistic people are also willing to take more risks. Risk taking in different context might also be related differently to efficacy beliefs depending on what source is in control. We find that general risk-taking correlates positively with all types of efficacy beliefs. However, self-efficacy and relative self-efficacy have the largest partial correlations. Partial correlations controlling for dispositional optimism show that self-efficacy still has a significant unique contribution to explaining self-reported risk-taking. This could indicate that self-reported risk taking is not only based on the idea that one passively accepts risks or that one is consciously optimistic, but that people anticipate their own actions to reduce risks. If they are able to perform such activities, then they can report that they (can) take more risks in general. Risk-taking in financial issues only correlates significantly with chance-efficacy. For risk-taking in games and playing, relative-self-efficacy and chance-efficacy play a major role. Therefore, in different domains risk-taking depends differently on the different types of efficacy beliefs. Furthermore, risk-taking in games and playing is an example, where self-efficacy does not matter but relative self-efficacy, which indicates that both types of self-efficacy might be worth being distinguished. A similar observation can be made when looking at the correlations with entrepreneurial attractiveness and entrepreneurial intentions.

Literature suggests that a person's intention to start a business is very much influenced by the person's perceptions of risk (Simon et al. 2000, Keh et al. 2002), her risk-taking and beliefs about self-efficacy (e.g., Shane and Eckhardt, 2003). For *attractiveness of entrepreneurship* and temporally more distant *entrepreneurial intentions*, i.e. five years or sometimes, self-efficacy plays a major role and has significant partial correlation. For the intention for the next year,

however, relative self-efficacy is a major driver. The temporally less distant the intention is, from sometimes in the future, over five years, until next-year intention, the partial correlation of self-efficacy is steadily decreasing. In fact, if one calculates the partial correlation of self-efficacy while controlling for relative-self-efficacy for all four variables (attractiveness and intentions) the partial correlation is insignificant with $p>0.35$ for all variables related to entrepreneurship (not reported in the Table 3). It is thus the relative self-efficacy that matters in this context. The table also reports partial correlations for intentions when controlled for attractiveness. One quickly observes that the relative-self-efficacy remains significant. It is thus relative-self-efficacy that contributes more to an entrepreneurial intention than self-efficacy through increasing attractiveness but also directly once controlled for attractiveness.

As constructs that are not associated with optimism in general but perhaps with self-efficacy we consider curiosity and the related construct of voluntary information broking. We expect that people who feel competent also value information more, because they can utilize them in more efficient ways. They therefore are also more willing to engage in information search. *Curiosity* is indeed positively correlated with self-efficacy; however, it is not correlated with other- or chance-efficacy. *Voluntary information broking*, representing the fact that one also tries to link others, is additionally positively correlated with other-efficacy. Controlling for curiosity further supports this; only other-efficacy remains significant, while self-efficacy and relative self-efficacy become insignificant. This indicates that information broking is based on curious people who trust in the help of others. This in turn could suggest that information broking (voluntarily and non-commercial, as it is conceptualized for the measurement instrument used here) is based on reciprocity: Because other people help, one also tries to help others to find the information they need.

To sum up, we observe that the different types of efficacy belief correlate as expected with other variables. We also see that the different types correlate differently and as such seem to tap different aspects of a dispositional optimism. Correlations with information search behavior illustrates that self-efficacy and other-efficacy can play clearly distinguished roles, suggesting that also in other circumstances measuring all three types of efficacy beliefs might contribute to a better understanding of the fundamental mechanisms beyond a dispositional optimism or pure self-efficacy.

7 LIMITATIONS AND FURTHER RESEARCH

As discussed throughout the results sections, this study replicates several effects already reported in the literature, which provides some confidence in the fact that the new scale system and related new results are reliable, too. There are, however, some limitations to this study that are worth being discussed and open the path for future research.

A limitation of the study reported here is the fact that all surveys reported in this article are based on the German version of items. One could argue that it might lead to different results once used in another language. However, a companion study with about one thousand employees in a US hospital is able to support the three-dimensional factor structure with internal reliabilities operationalized as Cronbach's alpha above 0.7 (paper is available on request). As such there is some confidence in the good properties of the scale system, even when translated into different languages. Additional studies with other types of populations still remain to be done to further investigate the robustness of the results of this study.

Another issue to be discussed relates to the fact that almost all items of the new scale system are positively worded. While the life-orientation test (LOT-R) is intentionally based on

an equal number of positively and negatively worded items (Scheier et al., 1994), the New Generalized Self-efficacy (NGSE) scale developed by Chen et al. (2001) only utilizes positively worded items. The efficacy scale system introduced in this article follows the setup of NGSE. The first step reported in this article replicates findings by Spector (1987), Scheier et al. (1994), and Rauch et al. (2007) with respect to the two-factorial structure of the LOT-R and the fact that positively worded items correlated differently with social desirability than negatively worded items. Based on this, it is no surprise that the three-dimensional model, which shows very good psychometric properties, does not mix positively with negatively worded items, while the weaker fourth dimension contains one negatively worded item.

This study focused on general beliefs about the efficacy of self, others, and chance. As already discussed, there is a discussion on whether or not general self-efficacy can help us understanding the judgments and behavior of people and whether or not more specific conceptualization are the only way to go. In principal one could extent the arguments of this discussion to other types of efficacy beliefs, too. With respect to this discussion, we follow Judge et al. (1997, 1998) and Chen et al. (2001) and believe that general efficacy beliefs enable us to understand human behavior across contexts. Further support for this can be drawn from the extensive empirical literature on locus of control, which according to Rotter (1966) is defined and operationalized as a general expectancy. Literature on locus of control opens a path for future research. Levenson (1974) suggests a three-dimensional conceptualization of locus of control, where she distinguishes self, powerful others, and chance. Their scale could be combined with the scale developed in this study. The combination enables researchers to measure a person's beliefs about the general structure of sources of one's success (locus of control) *and* about the perceived efficacy of these sources with respect to one's life (efficacy

beliefs).

Besides developing the three-dimensional efficacy scale system, this study considered the fourth dimension of relative self-efficacy. While there is some support that absolute evaluations can and should be distinguished from comparative judgments, psychometrically the psychometric data collected for this study can neither support nor reject the hypothesis that these two constructs need to be distinguished. While this could be seen as a clear indicator for not distinguishing both constructs, the analysis of correlations with other variables indicates the opposite. Risk-taking in games and playing is not correlated with self-efficacy but with chance-efficacy and relative self-efficacy. For entrepreneurial intention, relative self-efficacy seems to be more important than self-efficacy. The dependencies between these two constructs as well as their relation to other constructs should be investigated in future research. For exploratory purposes, both dimensions should be distinguished, especially in domains where being good is not important but being better than others.

The shortness of the subscales could be considered a weakness of this study. The shortness as well as the generality of the items, however, provides the advantage that the scale system can be applied in many contexts, including surveys sent out to managers and entrepreneurs, which frequently need to make use of short scales. While several studies include items that aim at measuring optimism, e.g. Wally and Baum (1994), Simon et al. (2000), Keh et al. (2002), this new scale system enables researchers to control four three distinguished types of dispositional optimism, i.e. those related to one's own competences, the perceived social support, and beliefs in good luck. As demonstrated in the last part of this study, these types may have different relevance for different research questions (dependent variables).

8 CONCLUSION

In this article a short scale system has been developed that measures self-efficacy, other-efficacy, and chance-efficacy with clearly distinguished subscales. Psychometric properties of the three-dimensional scale system meet the most conservative and frequently used criteria. For exploratory research a fourth subscale, i.e. relative self-efficacy, was introduced. The four-dimensional system including relative self-efficacy is sufficient for further exploratory research but has slightly less favorable psychometric properties. The different efficacy beliefs correlate differently with various other variables, indicating that these types of general efficacy beliefs need to be distinguished. Focusing on general efficacy beliefs suggests combining this new scale system with Levenson's (1974) IPC control beliefs, which describe the relative importance of the three factors for one's outcomes in life. The new scale system's reliability and its parsimony lend the scale system for use in survey where the number of items is a limiting feature. The correlation analysis reported in this study, especially those of information search behavior and entrepreneurial attitudes, illustrates the potential use in organizational and entrepreneurial behavior.

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Figure 1: Graphical illustration of CFA for the three- and four factor solution for sample 4_2

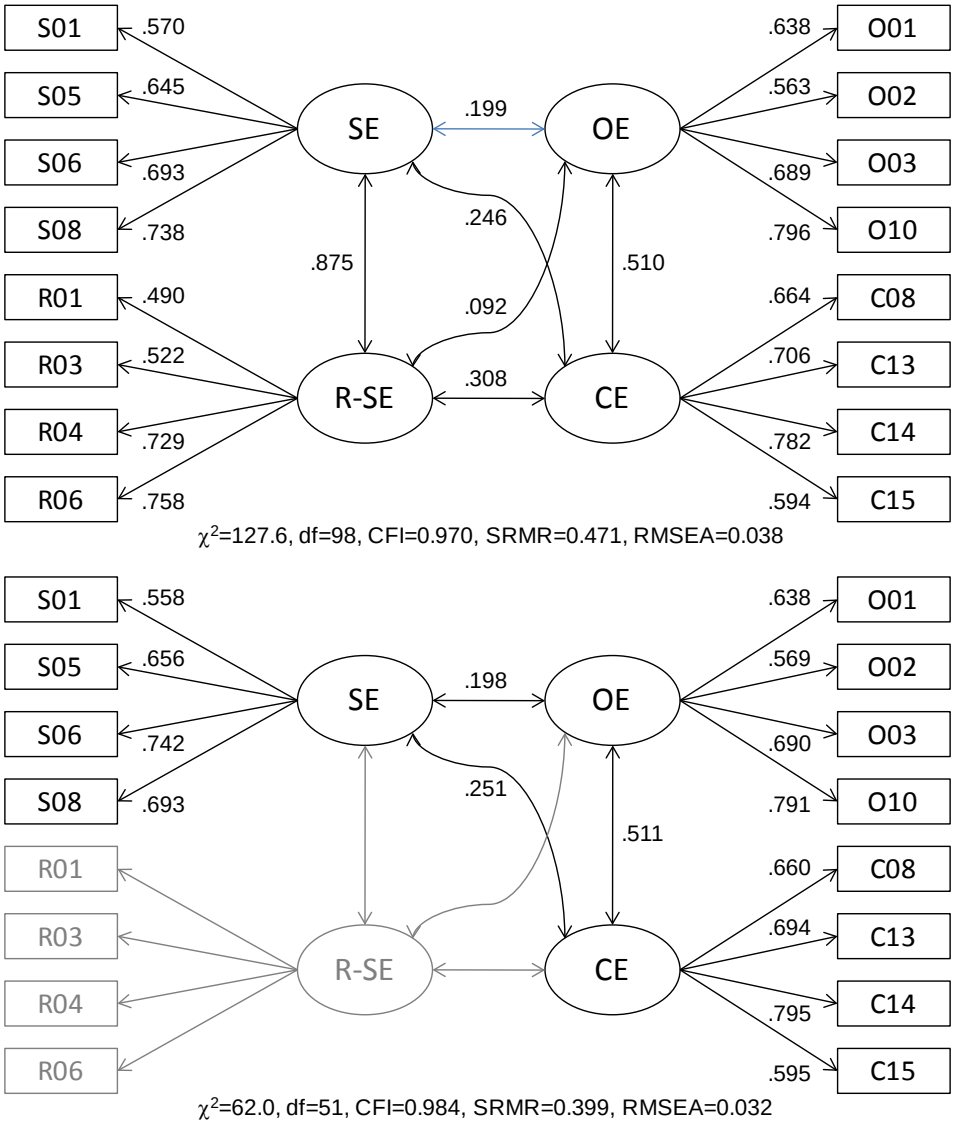

TABLE 1

Description of data sets.

Sample ID	**Lecture**	**Sample size**[1)]	**Gender** (women/men)	**Age** (mean/median/std.)	**Semester** (mean/median/std.)
1	Micro economics	106 (107)	45% /55%	23.2 / 23 / 2.39	5.76 / 5 / 2.25
	Foreign trade	66 (68)	50% / 50%	23.2 / 21 / 6.03	3.27 / 3 / 1.54
	Full sample 1	172 (175)	47% / 53%	23.2 / 22 / 4.15	4.80 / 5 / 2.34
2	Biological psychology	197 (202)	82% / 18%	21.7 / 21/ 2.83	2.99 / 2 / 1.16
3	Inheritance law	108 (112)	47% / 53%	21.3 / 21 / 1.89	4.04 / 4 / 1.51
	Economic and Social history	123 (132)	63% / 37%	21.3 / 21 / 2.25	2.70 / 2 / 1.94
	Full sample 3	230 (244)	55% / 45%	21.3 / 21 / 2.09	3.33 / 2 / 1,87
4	Public law	264 (285)	59% / 41%	20.65 / 20 / 1.76	2.27 / 2 / 1.09

[1)] Number in parentheses reports the size of the full sample including those participants that were excluded for confirmatory factor analyses due missing data in relevant variables.

TABLE 2

Model summaries: Confirmatory factor analyses with standardized coefficients, Goodness of fit measures, Cronbach's alphas, and correlations of sum scores.

Model/Sample →		I / 1 [1]			I / 2		II / 2 [1]		II / 3		III / 4_1 [1]	III / 4_2		
(S)elf-efficacy	S01	654	680	675	574	642	575	635	493	547	-	558	570	556
	S05	610	560	541	768	713	755	693	762	696	-	656	645	631
	S06	689	698	673	737	700	745	697	784	728	-	742	693	659
	S08	513	521	517	615	649	625	678	555	650	-	693	738	715
Cronbach's α		704	704	+[3]	753	753	754	754	738	738	-	751	751	+[3]
(R)elative self-efficacy	R01	-	530	513	-	464	-	516	-	573	-	-	490	466
	R03	-	738	699	-	685	-	646	-	531	-	-	522	530
	R04	-	528	518	-	574	-	621	-	778	-	-	729	688
	R06	-	-		-	-	-	627	-	763	-	-	758	722
Cronbach's α		-	633	789[3]	-	600	-	692	-	746	-	-	696	822[3]
(O)ther-efficacy	O01	769	770	772	777	774	751	752	761	763	-	638	638	637
	O02	554	555	556	640	644	646	646	552	552	-	569	563	571
	O03	531	527	524	700	699	709	709	555	555	-	690	689	692
	O04	426	428	429	201	201	-	-	-	-	-	-	-	-
	O10	-	-	-	-	-	702	702	719	718	-	791	796	790
Cronbach's α		650	650	650	639	639	791	791	741	741	-	761	761	761
(C)hance-efficacy	C06	571	576	577	718	786	-	-	-	-	-	-	-	-
	C07	706	692	697	497	394	-	-	-	-	-	-	-	-
	C08	451	460	453	447	384	591	590	526	522	389	660	664	661
	C11	-	-	-	-	-	523	525	343	297	-	-	-	-
	C12	-	-	-	-	-	740	739	658	700	-	-	-	-
	C13	-	-	-	-	-	-	-	-	-	700	694	706	699
	C14	-	-	-	-	-	-	-	-	-	928	795	782	790
	C15	-	-	-	-	-	-	-	-	-	515	595	594	596
Cronbach's α		593	593	593	590	590	654	654	482	482	707	776	776	776
Covariances	O x S	.425	.420	.433	.222	.223	.213	.210	.161	.171	-	.198	.199	.156
	C x S	.250	.254	.332	.318	.339	.420	.435	.266	.262	-	.251	.246	.288
	C x O	.705	.709	.708	.461	.460	.490	.489	.448	.424	-	.511	.510	.508
	R x S	-	.900	-	-	.970	-	.937	-	.819	-	-	.875	-
	R x O	-	.429	-	-	.243	-	.173	-	.132	-	-	.092	-
	R x C	-	.426	-	-	.430	-	.337	-	.294	-	-	.308	-
Fit indices	N	172	172	172	197	197	196	196	230	230	50	214	214	214
	χ^2	53.5	105.9	112.2	53.5	119.5	54.9	145.9	75.1	177.8	4.0	62.0	127.6	142.4
	Df	41	71	74	41	71	41	84	41	84	2	51	98	101
	CFI	.961	.929	.922	.970	.923	.974	.925	.932	.894	.956	.984	.970	.958
	RMSEA	.042	.054	.055	.040	.059	.042	.061	.060	.070	.141[2]	.032	.038	.044
	SRMR	.0557	.0602	.0623	.0563	.0610	.0482	.0563	.0608	.0664	.0622	.0399	.0471	.0492
Correlation of sum scores	O x S	.263	.263	.292	.147	.147	.153	.153	.118	.118	-	.154	.154	.155
	C x S	.172	.172	.240	.198	.198	.318	.318	.170	.170	-	.196	.196	.253
	C x O	.418	.418	.418	.295	.295	.329	.329	.318	.318	-	.390	.390	.390
	R x S	-	.603	-	-	.674	-	.695	-	.621	-	-	.642	-
	R x O	-	.259	-	-	.143	-	.130	-	.122	-	-	.129	-
	R x C	-	.265	-	-	.182	-	.329	-	.160	-	-	.253	-

[1] Items were selected based on an exploratory common factor analysis on the same sample.

[2] 90% confidence interval between 0 and .348

[3] Self-efficacy and relative self-efficacy combined into a single factor

Table 3

Correlations and partial correlations of factor-specific expectancies with other variables.

	N	mean	std.	α	Self-efficacy		Other-efficacy		Chance-efficacy		Relative self-efficacy	
					corr.	*part. c.*	*corr.*	*part. c.*	*corr.*	*part. c.*	*corr.*	*part. c.*
Dispositional optimism	261	3.85	1.02	.735	.485***	.449***	.359***	.177***	.534***	.492***	.439***	.130*
Curiosity	263	4.78	1.03	.680	.457***	.448***	.070	.000	.097	.000	.393***	.152*
Information broking	261	4.45	1.17	.870	.207***	.184***	.165**	.131*	.085	-.006	.222***	.112+
(control for curiosity)	261				-.022	-.041	.151*	.148*	.041	-.009	.039	.052
Control beliefs												
internal	121	5.13	0.65	.582	.558***	.546***	.115	.056	.124	.013	.411***	.099
powerful others	121	3.59	0.76	.655	-.070	-.080	.085	.091	.009	-.003	-.070	-.041
chance	124	3.72	0.67	.472	-.112	-.166+	.155	.121	.199*	.189*	-.111	-.096
Self-reported risk-taking												
general	262	4.22	1.46	-	.243***	.200***	.183***	.105+	.196***	.108+	.271***	.131*
(control for disp. opt.)					.132*	.137*	.060	.067	.079	.052	.181***	.127*
financial issues	263	2.71	1.48	-	.108+	.060	-.004	-.011	.237***	.208***	.151*	.071
career	263	4.07	1.51	-	.127*	.093	.095	.032	.157*	.115+	.185***	.114+
games and playing	263	3.66	2.07	-	.086	.042	.144*	.082	.178***	.127*	.159**	.108+
Entrepreneurial …												
attractiveness	251	58.6	29.1	-	.209***	.170**	.093	.004	.243***	.197***	.248***	.130*
intention (ever)	246	57.9	28.6	-	.209***	.179**	.099	.035	.164*	.108+	.261***	.152*
(control for attr.)					.104	.105	.050	.053	-.016	-.049	.132*	.092
intention (5 years)	247	38.5	28.6	-	.178**	.139*	.105	.029	.202**	.153*	.233***	.133*
(control for attr.)					.096	.079	.062	.028	.094	.066	.129*	.080
intention (1 year)	246	27.5	27.8	-	.125*	.108	.069	.034	.086	.048	.218***	.174**
(control for attr.)					.054	.055	.026	.030	-.019	-.036	.128*	.125+

Pearson correlations (corr.) with self-, other-, and chance-efficacy. For these three dimensions partial correlations (part. c.) are reported controlling for the remaining two dimensions. Additionally correlations with relative self-efficacy are reported and the partial correlations controlling for the remaining three dimensions. For some variables all these correlations are additionally reported while controlling for another variable.

APPENDIX A

Factor analyses separately for each of the three dimensions and selected items.

	Item[3]		Factor 1[2]	factor 2[2]	factor 3[2]
Self-efficacy (N=172)					
When facing difficult tasks, I am certain that I will accomplish them.	S01[o]	(NGSE)	**.606 (.443)**	-.539 (-.294)	-
In general, I think that I can obtain outcomes that are important to me.	S02	(NGSE)	.443 (-.021)	**-.829 (-.840)**	-
I believe I can succeed at most any endeavor to which I set my mind.	S03	(NGSE)	**.626 (.401)**	**-.630 (-.408)**	-
I will be able to successfully overcome many challenges.	S04	(NGSE)	**.642 (.433)**	**-.618 (-.379)**	-
I am confident that I can perform effectively on many different tasks.	S05[o]	(NGSE)	**.556 (.448)**	-.442 (-.195)	-
Even when things are tough, I can perform quite well.	S06[o]	(NGSE)	**.611 (.460)**	-.528 (-.274)	-
I will be able to achieve most of the goals that I have set for myself.	S07	(NGSE)	.469 (.016)	**-.828 (-.819)**	-
Compared to other people, I can do most tasks very well.	R04	(NGSE)	**.547 (.634)**	-.192 (.157)	-
If it only depends on my abilities, then I will be successful.	S08[o]		**.632 (.617)**	-.368 (-.027)	-
	eigenvalue		*4.237*	*1.059*	
Other-efficacy (N=169)					
I am always optimistic regarding support from others.	O01[o]		**.641 (.636)**	-.104 (-.061)	-
In general, I expect that more people will support than hinder me.	O02[o]		**.569 (.552)**	-.286 (-.249)	-
Other people generally have my best interests at heart.	O03[o]		**.532 (.521)**	-.191 (-.156)	-
One can never rely on deals with rivals.	O04[o]		**.518 (.526)**	.079 (.115)	-
Working with others is always a gain.	O05		.218 (.163)	**-.824 (-.813)**	-
If other can hinder me, then they are most likely to do it.	O06		**.429 (.437)**	.086 (.115)	-
I never believe that other work with me as I would expect	O07		**.409 (.410)**	-.010 (.018)	-
Only if I am good, I will be supported by others.	O08		.095 (.110)	.217 (.225)	-
Even if I am very good, in a group I mostly become even better.	O09		.113 (.083)	**-.454 (-.449)**	-
	eigenvalue		*2.493*	*1.475*	*1.003[1]*
Chance-efficacy (N= 171)					
In uncertain times, I usually expect the best.	C01	(LOT-R)	.335 (.236)	.372 (.296)	-.085 (.090)
If something can go wrong for me, it will.	C02	(LOT-R)	.261 (.078)	.160 (-.057)	**-.597 (-.587)**
I'm always optimistic about my future.	C03	(LOT-R)	**.916 (.967)**	.278 (-.171)	-.358 (-.069)
I hardly ever expect things to go my way.	C04	(LOT-R)	.345 (.067)	.339 (.107)	**-.708 (-.651)**
Overall, I expect more good things to happen to me than bad.	C05	(LOT-R)	**.466 (.318)**	.357 (.141)	-.399 (-.243)
I rarely count on good things happening to me.	C06[o]	(LOT-R)	.271 (.025)	**.450 (.364)**	-.361 (-.239)
I would never rely on luck	C07[o]		.244 (-.177)	**.783 (.803)**	-.374 (-.188)
When my success depends on luck, then I often do better than others would expect.	C08[o]		.317 (.143)	**.514 (.488)**	-.084 (.118)
Fate always favors me.	C09		**.535 (.412)**	.351 (.101)	-.398 (-.220)
Fortune favors the bold.	C10		**.637 (.549)**	.416 (.157)	-.293 (-.050)
	eigenvalue		*3.415*	*1.199*	*1.117*
Rivalry (N=173)					
When I enter into a competition, my rivals are often worse off than I am.	R01[o]		.212 (-.011)	**.660 (.663)**	-
Competition brings out the best in me.	R02		**.668 (.615)**	.363 (.157)	-
When evaluating my chances for success in a competition with others, I tend to be pessimistic.	R03[o]		.535 (.391)	**.558 (.427)**	-
Compared to other people, I can do most tasks very well.	R04[o]		.181 (-.038)	**.639 (.652)**	-
Having competition always hurts me.	R05		**.759 (.809)**	.125 (-.147)	-
	eigenvalue		*2.212*	*1.187*	-

Common factor analysis with oblique rotation. Cells report full factor loading and unique loading from pattern matrix in parentheses.

1) Only two factors extracted because they provide a factor structure easier to interpret.

2) Bold numbers indicate cells with unique factor loadings above 0.35

3) Items market with 'o' are selected for further analysis.

APPENDIX B

Factor analyses separately for each of the three dimensions and selected items.

Item		3 factor solution			4 factor solution			
		1	**2**	**3**	**1**	**2**	**3**	**4**
When facing difficult tasks, I am certain that I will accomplish them.	S01	**.559**	.080	.047	**.589**	.078	.024	-.013
I am confident that I can perform effectively on many different tasks.	S05	**.616**	-.055	-.071	**.682**	-.060	-.095	-.062
Even when things are tough, I can perform quite well.	S06	**.674**	.060	.064	**.756**	.062	.046	-.063
If it only depends on my abilities, then I will be successful.	S08	**.746**	.062	.123	**.582**	.064	.093	.266
I am always optimistic regarding support from others.	O01	.067	**.640**	-.006	.101	**.622**	-.028	-.012
In general, I expect that more people will support than hinder me.	O02	.010	**.579**	-.004	-.156	**.611**	-.002	.275
Other people generally have my best interests at heart.	O03	-.029	**.667**	-.045	.027	**.648**	-.064	-.049
When confronted with difficult tasks I can bank on other's help.	O10	-.016	**.751**	-.065	.123	**.741**	-.084	-.165
When my success depends on luck, then I often do better than others would expect.	C08	-.034	.133	**-.596**	-.070	.128	**-.602**	.040
I can rely on my luck.	C13	.032	.040	**-.674**	-.006	.034	**-.681**	.036
Luck has never let me down.	C14	-.010	.015	**-.789**	.044	.004	**-.806**	-.108
I rarely have bad-luck.	C15	.030	-.042	**-.614**	-.002	-.045	**-.617**	.026
When I enter into a competition, my rivals are often worse off than I am.	R01	**.435**	.075	-.039	.135	.082	-.054	**.478**
When evaluating my chances for success in a competition with others, I tend to be pessimistic.	R03*	**.522**	.013	-.038	**.471**	.013	-.058	.091
Compared to other people, I can do most tasks very well.	R04	**.666**	-.151	-.156	**.395**	-.151	-.182	**.589**
In those things that I am involved, I belong to the best.	R06	**.737**	-.106	-.005	**.470**	-.104	-.030	**.582**
Initial eigenvalues		*4.387*	*2.721*	*1.484*	*4.387*	*2.721*	*1.484*	*1.003*
Extracted factors		*3.834*	*2.195*	*0.959*	*3.867*	*2.221*	*0.977*	*0.437*
After rotation		*3.385*	*2.363*	*2.590*	*3.154*	*2.296*	*2.647*	*1.712*

Common factor analysis with oblique rotation, cells with unique loading from pattern matrix (values above 0.35 are bold, N=214, sample 4_2).

APPENDIX C

Items for the final scale system (original German items and their English translations)

Self-efficacy	
Wenn ich vor einer schwierigen Aufgabe stehe, bin ich mir sicher, dass ich sie bewältigen werde.	When facing difficult tasks, I am certain that I will accomplish them.
Wenn es nur auf mein Können ankommt, dann werde ich Erfolg haben.	If it only depends on my abilities, then I will be successful.
Ich bin mir sicher, dass ich viele verschiedene Aufgaben effektiv erledigen kann.	I am confident that I can perform effectively on many different tasks.
Auch wenn es hart auf hart kommt, kann ich gute Leistungen erbringen.	Even when things are tough, I can perform quite well.
Chance-efficacy	
Wenn ich auf den Zufall angewiesen bin, dann klappt es meist besser als andere es vermuten würden.	When my success depends on luck, then I often do better than others would expect.
Ich kann mich auf mein Glück verlassen.	I can rely on my luck.
Das Glück hat mich selten im Stich gelassen.	Luck has never let me down.
Pech habe ich so gut wie nie.	I rarely have bad-luck.
Other-efficacy	
Ich bin immer optimistisch bezüglich der Unterstützung durch andere.	I am always optimistic regarding support from others.
Insgesamt erwarte ich, dass mich mehr Leute unterstützen als behindern.	In general, I expect that more people will help than hinder me.
Andere Menschen meinen es meistens gut mit mir.	Other people generally have my best interests at heart.
Bei schwierigen Aufgaben kann ich mich auf Hilfe anderer verlassen.	When confronted with difficult tasks I can count on the help of others.
Relative self-efficacy	
Wenn ich mich auf einen Wettbewerb einlasse, dann haben die anderen meist die schlechteren Karten.	When I enter into a competition, my rivals are often worse off than I am.
Bei der Einschätzung meiner Erfolgschancen im Wettbewerb mit anderen, bin ich eher pessimistisch.	When evaluating my chances for success in a competition with others, I tend to be pessimistic.
Im Vergleich zu anderen kann ich die meisten Aufgaben sehr gut erfüllen.	Compared to other people, I can do most tasks very well.
In dem was ich mache, gehöre ich zu den Besten.	In those things that I am involved in, I belong to the best.