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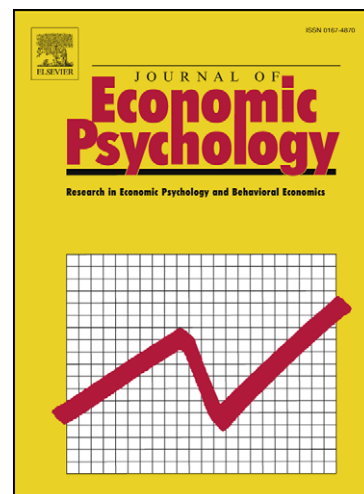
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The structure of optimism: “Controllability affects the extent to which efficacy beliefs shape outcome expectancies”

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Abstract. In this article we theoretically develop and empirically test an integrative conceptual framework linking dispositional optimism as general outcome expectancy to general efficacy beliefs about internal (self) and external (instrumental social support and chance) as well as to general control beliefs (locus-of-control). Bandura (1997, *Self-Efficacy. The Exercise of Control* (p. 23). New York: Freeman), quoted in title, suggests – at a context-specific level - that controllability moderates the impact of self-efficacy on outcome expectancies and we hypothesize that – at a general level – this also applies to dispositional optimism. We further hypothesize that locus of control moderates the impact of external-efficacy beliefs, but in the opposite direction as self-efficacy. Our survey data of 224 university students provides support for the moderation of self-efficacy and chance-efficacy. Our new conceptualization contributes to clarifying relationships between self- and external-efficacy beliefs, control beliefs, and optimism; and helps to explain why equally optimistic individuals cope very differently with

adverse situations.

ACCEPTED MANUSCRIPT

1 INTRODUCTION

Dispositional optimism, defined as a general personal expectation that good things rather than bad things will happen (Scheier and Carver, 1987), has attracted substantial research interest in the fields of economics and psychology (compare the overviews by Peterson, 2000; Puri and Robinson, 2007). Dispositional optimism has been shown to affect health, physical well-being, and perceived stress (Scheier and Carver, 1985, 1987) and is associated with active coping rather than avoidance strategies (Solberg Nes and Segerstrom, 2006). In addition, it has been found to be related to different types of investment behavior (Puri and Robinson, 2007; Felton et al. 2007) and it affects job markets through its effect on job search and job choice behavior (Kaniel, Massey, and Robinson, 2010). Furthermore, it also influences entrepreneurial decision-making (Baron, 2004) and entrepreneurial performance (Hmieleski and Baron, 2009).

Scheier and Carver (1987), who pioneered the systematic study of dispositional optimism, emphasize that a person's general optimism can be caused by a variety of factors, as different as self-efficacy and belief in good-luck. Therefore, while two individuals may be equally optimistic in terms of the level of their optimism, the origins of this optimism might differ substantially. Specific factors which have been associated with optimism include general beliefs about self-efficacy (Karademas, 2006), good-luck (Day and Maltby, 2003, 2005), social support (Doeglas et al., 1996; Karademas, 2006), as well as control (Weinstein, 1980; Carver and Scheier, 1991; Abramson et al. 1978). Independent of their role with respect to dispositional optimism, general self-efficacy and general control beliefs, for instance, have been found to contribute to explaining job and life satisfaction (Spector, 1997; Judge et al., 1998), job performance (Judge and Bono, 2001), business creation as well as subsequent success and failure (Rauch and Frese, 2007).

Despite the wide interest in the role of dispositional optimism and potential sources of optimism, these factors have generally been studied independently of one another. In this study, we follow Scheier and Carver's (1987) thoughts on sources of optimism and develop an integrative framework that links dispositional optimism to general beliefs about the self, support from others, chance, and control. To accomplish this, we draw on social cognitive theory (Bandura, 1977, 1997) and Bandura's proposition that "controllability affects the extent to which efficacy beliefs shape outcome expectancies" (1997, p. 23). Extending this proposition from the context-specific to the general level, we propose that general self-efficacy will be more positively related to dispositional optimism if people believe that their outcomes mostly depend on their own actions and performance, which Rotter (1966) refers to as an internal locus of control. Further extending this argument to beliefs about the efficacy of external factors such as social support (other-efficacy) and chance (chance-efficacy), we argue that these external-efficacy beliefs will be less positively related to dispositional optimism the more a person believes that he or she is in control. We test our hypotheses based on a survey of 224 undergraduate university students. While we find support for the moderation effects of locus of control for general self-efficacy and general chance-efficacy, locus of control does not moderate the relationship between other-efficacy and dispositional optimism. Our theoretical framework and empirical findings contribute to better understanding the structural relationships between dispositional optimism (general outcome expectancies), general self-efficacy, locus of control (general control beliefs), and general beliefs about the efficacy of external factors (general perceptions of instrumental social support and good luck). Specifically, our study provides insights into the diverse sources of optimism, and highlights the moderating role that locus of control plays for this system of beliefs.

Our results also inform research on the relationship between locus of control and dispositional optimism. The identified moderation effects provide theoretical reasons for expecting possibly negative associations between more control and optimism – an effect that is occasionally observed in empirical studies (compare the overview by Burger, 1989), but that is inconsistent with standard arguments that more control leads to more optimistic outcome expectancies (compare, e.g., Weinstein, 1980).

Further, our study informs research that addresses the relationships between dispositional optimism and people's behavior such as persistence and coping (e.g., Scheier and Carver, 1985, 1987; Solberg Nes and Segerstrom, 2006), job search (e.g., Kaniel et al., 2010), and entrepreneurial behavior (e.g., Baron, 2004). Despite having the same level of optimism, which drives individuals to persist in the face of adversity, differences in the sources and structure of this optimism may affect the specific (coping) behavior. People whose optimism is based on control and self-efficacy might persist and engage in active coping, while people whose optimism is based on believing in other people's help and luck, might just passively persist by waiting for help and luck. Considering the multiple drivers of optimism, as identified in this study, can provide a more fine-grained approach to more deeply understand the behavioral consequences of dispositional optimism.

In the first part of this study, Section 2, we develop the theoretical framework and derive corresponding hypotheses on the relationships between dispositional optimism and general control and efficacy beliefs. In Sections 3 and 4, we report an empirical test of our hypotheses. While Section 3 introduces the methodology and the data, Section 4 reports the analysis of the data. Section 5, discusses the results and limitations of our research design. Section 5 also highlights important implications for theory development and empirical research as well as

suggests paths for future investigation.

2 THEORY AND HYPOTHESES DEVELOPMENT

Dispositional optimism is defined by Scheier and Carver (1987) as a general expectancy that in life good things rather than bad things will happen. Scheier and Carver's conceptualization of optimism explicitly focuses on "expectancies for the occurrence of good versus bad outcomes" (p. 171) and – in contrast to, e.g. explanatory style and other constructs related to optimism – distinguishes outcome expectancies from attributions of causes for these expectancies (Scheier and Carver, 1987; Peterson 2000). This source-independent conceptualization of optimism has been made explicit by Scheier and Carver (1987, p. 170):

In our view, a person may hold favorable expectancies for any number of reasons—because of personal efficacy, because the person is lucky, because he or she is favored by God, or for other reasons. The result in any case should be an optimistic orientation—that is, generalized expectations that good things will happen.

In our effort to better understand dispositional optimism and its antecedents and correlates, we follow the lead by Scheier and Carver (1987) and study the relationship between dispositional optimism and general beliefs about various potential sources of optimism. Our theoretical framework is based on Bandura's social cognitive theory (1977, 1997) applied to life in general instead of specific contexts and the conceptual clarifications with respect to control and efficacy beliefs as provided by Skinner (1996) and Rotter's (1975). Furthermore, we draw on related work from Levenson (1974) to distinguish between external factors with respect to chance and powerful others.

2.1 General self-efficacy and locus of control

At the core of Bandura's (1977, 1997) social cognitive theory – especially its component related to self-efficacy – there is the conceptual distinction between context-specific beliefs about one's own performance (self-efficacy), expectancies of one's favored outcomes, and beliefs about the degree to which the occurrences of one's favored outcomes depend on one's own performance (control beliefs):

“Perceived self-efficacy is a judgment of one's ability to organize and execute gives types of performances, whereas an outcome expectation is a judgment of the likely consequences such performances will produce. [...] Controllability affects the extent to which efficacy beliefs shape outcome expectancies [...]” (Bandura, 1997, p. 21 and 23)

Bandura (1977, 1997) clearly distinguishes between self-efficacy, outcome expectancies, and control beliefs. The belief that one can perform well given a sufficient effort is referred to as *self-efficacy*. The perceived link between one's performance and the likelihood of one's desirable outcome is referred to as *control belief* (Bandura, 1977 1997). This matches with Rotter's (1966, p. 1) definition of internal locus of control as the perception “that the event is contingent upon his own behavior or his own relatively permanent characteristics.”¹ The distinction of self-efficacy and outcome expectancy at a context-specific level mirrors Scheier and Carver's (1987)

¹ Based on a survey of terms that are used by academic researchers to refer to concepts of control, Skinner (1996) reports that the term control is not used in an unambiguous way, it is used to refer to outcome expectancies, self-efficacy, as well as to control beliefs as defined by Rotter (1966) and Bandura (1977). A similar confusion is resolved by Ajzen (2002) with respect to the concept of perceived behavioral control in the well-established and frequently used Theory of Planned Behavior.

distinctions of corresponding constructs at the general level. These conceptual equivalences are the starting point for our theoretical argument.

While Bandura's (1977, 1997) social cognitive theory has been developed and is mostly applied in context-specific ways, Rotter (1975), Skinner (1996), Judge et al. (1997), and Judge et al. (2002) clarify that outcome expectancies, control, and efficacy beliefs can be usefully conceptualized along a continuum from the very context-specific to the very general level: "At the specific pole are control beliefs that are relevant only to certain episodes, interactions, or behaviors, such as being able to lift weights of a certain number of pounds or solve subtraction problems involving certain number of digits. At the general or global pole are beliefs than span all outcomes and areas in life" (Skinner, 1996, p. 555) and, further "It can also be seen that the distinction between specific expectancy and generalized expectancy is also arbitrary and is only a means of clarifying the problem of arriving at an accurate estimate." (Rotter, 1975, p. 55)

In order to better understand dispositional optimism, we apply Ajzen and Fishbein's compatibility principle (compare Ajzen, 1988) and conceptualize control beliefs, self-efficacy beliefs, and external-efficacy beliefs at the same level as dispositional optimism, which is, related to one's life in general. Mirroring Bandura's (1977) conceptualization of context-specific self-efficacy, *general self-efficacy* is defined as "individuals' perceptions of their ability to perform across a variety of situations." (Judge et al., 1998, p. 170) Similarly we consider control beliefs at a general level. Note that despite generalizing across contexts, we follow Levenson

(1974) and keep a first-person – as it is assumed for dispositional optimism – rather than third-person focus and do not consider beliefs that generalize beyond the own person.²

Despite Bandura's (1997) skepticism about the benefits of studying general beliefs and, in particular, general self-efficacy, general beliefs are especially useful if these general beliefs are assumed to reflect personality differences (Rotter, 1975; Boone and de Brabander, 1993, Judge et al., 1997). Empirical relevance is, for instance, revealed by Chen et al. (2001, 2004) who show that general self-efficacy affects task performance. While Judge et al. (1998) find associations of general self-efficacy and locus of control with job and life satisfaction, Judge and Bono's (2001) meta-analysis additionally reveals substantial associations with job performance. Schweizer and Koch (2001) explicitly consider general self-efficacy as a component of general optimism, whereas optimism about social and other person-independent matters are distinguished parts. Both general self-efficacy and locus of control have been found to be related to business creation as well as success (Rauch and Frese, 2007), and – not the least important with respect to our study – both have been found to be positively related to dispositional optimism (Bryant and Cvengros, 2004; Karademas, 2006, Carver and Scheier, 1991).

For context-specific beliefs, Bandura (1997) suggests that the relationship between self-efficacy and outcome expectancies is moderated by control beliefs. His logic is straight forward: If one's own performance and, more generally spoken, factors under one's own control are

² In contrast, third-person views or a worldviews are beliefs that represent generalizations beyond the individual to other or to all people within an organization (compare Levenson, 1974, Chen et al., 2004). For instance, while Levenson's (1974) measure of control focuses on first-person views, Rotter's (1966) measure of locus of control, asks for both third-person and first-person views, e.g. "Capable people who fail to become leaders have not taken advantage of their opportunities," or "Many times I feel that I have little influence over the things that happen to me". Predicting outcome expectancies for oneself based on beliefs about people in general would lead to what Ajzen (1988) refers to as evaluative inconsistency that can be a reason for not observing theorized relationships (compare insignificant effects of optimism on entrepreneurial opportunity recognition in Simon et al., 2000, and Keh et al., 2002, where optimism was measured in a way generalized beyond the first-person.

perceived as not influencing the likelihood of the occurrence of desired outcomes, then beliefs about this performance and these factors will not influence a person's belief about the likelihood of such outcomes. If, on the contrary, all factors influencing the occurrence of favored outcomes are under one's own control or if the own performance completely determines the outcome, then such beliefs about internal factors and the own performance will completely determine outcome expectancies.

This interaction or an interaction of closely related constructs has been empirically supported in the job context with respect to work stress measured as blood pressure (Schaubroeck and Merrit, 1997, Schaubroeck et al., 2000). It has also been observed by Krueger and Dickson (1994) for entrepreneurial opportunity recognition. Recent results reported by Monsen et al. (2010) suggest that both variables interact with respect to selection into entrepreneurship. Similarly, Litt (1988) shows that self-efficacy and locus of control interact with respect to a person's choice and persistence when confronted with an aversive stimulus.

Since the same arguments can be put forward at a general level as at the specific level, just differing with respect to the generality of the considered beliefs and behaviors, we believe that Bandura's (1997) proposed moderation hypothesis should hold true at both the context specific and the general levels, and thus we propose our first hypothesis:

Hypothesis 1: The relationship between general self-efficacy and dispositional optimism is more positive if individuals perceive more internal control and less positive if they perceive more external control.

2.2 General external-efficacy and locus of control

According to Bandura (1997), self-efficacy beliefs influence outcome expectancies when an individual believes that he or she is in control, at least to a large extent. What, however, influences outcome expectancies if an individual does not believe that he or she is in control; that is, if mostly external factors influence whether or not one experiences favourable outcomes? Skinner (1996) argues that efficacy beliefs cannot only be defined for the self (self-efficacy), but also for other factors affecting these outcomes. Following this idea, we refer to efficacy beliefs about these other factors, which are not under one's own control, as *external-efficacy beliefs*. Building on the work by Rokeach (1968), Levenson (1974), and Judge et al. (1997), we further differentiate between other people, on the one side, and chance and nature, on the other side, as external factors. We suggest that especially if an individual does not believe to be in control, generalized beliefs about the efficacy of such external factors will influence generalized outcome expectancies, that is, dispositional optimism.

We define *general other-efficacy beliefs* as the expectancy that, across a variety of different situations in life, those who have the power to either help or hinder one's own outcomes are more likely to actually help and not hinder. Other-efficacy overlaps with the construct of perceived social support, which is broadly defined as the availability of help in times of need from supervisors, coworkers, family members, and friends (Rahim, 1997). Suurmeijer et al. (1995) distinguish 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 latter refers to support that directly helps to achieve desired outcomes, it is instrumental. The former, however, refers to support that may help dealing with consequences of not achieving or expecting not to achieve one's desired outcomes or refers to support where the "support" is the

desired outcome, e.g. the need to experience sympathy. As this study's goal is to complement general self-efficacy as the belief to be able to execute required actions, the focus is on instrumental social support. To make the conceptual parallelism with general self-efficacy more explicit we label perceived general instrumental social support as general other-efficacy.

Karademas (2006) reports that perceived social support positively correlates with optimism; he focused, however, on emotional support and not – as we do – on instrumental social support. Schweizer and Schneider (1997) and Schweizer and Koch (2001) consider social optimism as a facet or dimension of optimism. Their conceptualization of social optimism, however, refers to a belief generalized beyond the individual, for instance, “Future generations will face a dark time.” In this article we focus on an evaluation of the world's efficacy with respect to one's own individual goals and not with respect to all people. Suurmeijer et al.'s (1995) concept of general instrumental social support, which corresponds to our conceptualization, has been found to be related to human behavior and judgments and, especially to general perceptions of quality of life (Doeglas et al.'s, 1996), which we believe should be closely related to believing that it is more likely to experience good than bad outcomes in life. General instrumental social support, which we refer to as general other-efficacy, is therefore a potential antecedent of expecting good things to happen (i.e. optimistic outcome expectancies).

Other people are just one possible external source of influence on one's own outcomes; nature and chance are another (compare Rokeach, 1968, Levenson, 1974; Judge et al., 1997). *General chance-efficacy*³ describes people's beliefs about events outside one's own and other

³ At the first glance, the term chance-efficacy might sound strange or even like a contradiction in terms. It has however been used to describe beliefs of jazz artists in the popular press who practiced an artistic technique called aleatory or aleatoricism: “Aleatory enjoyed its best run in the 1960's, when the influence of John Cage's philosophy, if not his actual music, tickled the imagination of avant-gardists the world over. However, so few

people's control, i.e., whether they believe that nature and luck help or hinder the occurrence of desired outcomes.

Research on the link between such beliefs and dispositional optimism is rare – not the least because such beliefs have rarely been distinctively conceptualized and operationalized. In developing the construct of belief-in-good-luck and a corresponding psychometric scale, Darke and Freedman (1997) report that their scale has virtually no correlation with dispositional optimism but a significantly positive correlation with the belief that life is controlled by luck and, thus, with an external locus of control. Because Darke and Freedman (1997) establish that belief in good luck negatively correlates with internal control and the literature on locus of control finds that internal control correlates positively with dispositional optimism, one might expect that belief-in-good-luck negatively correlates with dispositional optimism. In contrast, Day and Maltby (2003, 2005) find small but significantly positive correlation between belief-in-good-luck and dispositional optimism. We suspect that these mixed results are due to the fact that Darke and Freedman (1997) mix control beliefs about luck, e.g., “Luck plays an important part in everyone's life,” with efficacy beliefs about luck, e.g., “I consider myself to be a lucky person.” In fact, Maltby and colleagues (2008) report a multi-dimensional structure of Darke and Friedman's scale, where items that we would classify external control by chance and chance-efficacy separate into different factors. Our conceptualization provides a theoretical basis for

composers managed to exploit chance with much success, even in timid ways, that interest in such experiments gradually dried up. Today, Mr. Lutoslawski is one of few remaining believers in the efficacy of chance in music, possibly because as a Pole he feels attracted to the idea of freedom in any guise.” (Henahan D., January 29, 1988, Friday, Music: The Cleveland. The New York Times, pp. Section C; Page 36, Column 31; Weekend Desk) Further, the phrase “efficacy of chance” has also been referred to in Jules Verne's (1911) story, “A Floating City”: “[...] ‘if the meeting must take place, it seems to me that it can only do so in America, and before we get there, chance, which has brought about this state of things, will, perhaps, turn the scales in our favor.’ Captain Corsican shook his head like a man who had no faith in the efficacy of chance in human affairs.” These popular uses of the label efficacy of chance, perfectly match our use of this term.

Maltby's and colleagues' empirical finding and emphasizes the relevance of distinguishing not only self-efficacy from internal control (as advocated by Bandura, 1997), but also chance-efficacy from control by chance. If focused on chance-efficacy, we expect a positive correlation to dispositional optimism, which however becomes stronger if external factors including chance are perceived to have more control over one's life.

In summary, we propose that efficacy beliefs about external factors are more important the less individuals perceive internal control, that is, the more they believe that such external factors influence the occurrence of their favoured outcomes, as outlined in Hypotheses 2 and 3:

Hypothesis 2: The relationship between general other-efficacy and dispositional optimism is less positive if individuals perceive more internal control and more positive if they perceive more external control.

Hypothesis 3: The relationship between general chance-efficacy and dispositional optimism is less positive if individuals perceive more internal control and more positive if they perceive more external control.

Figure 1 provides a graphical representation of our theoretical framework and the three corresponding hypotheses.

Figure 1

3 EMPIRICAL TEST

We now proceed to empirically test our hypotheses using survey data. In this section we first describe our survey participants, and then the individual survey measures. The following section reports the results.

3.1 Participants and procedure

In April 2008, we distributed a questionnaire (in German) in two undergraduate courses at a German university, one course on economic and social history and one course on inheritance law. The students attending these lectures were majoring in a variety of subject areas, including law, teaching and education, economics, management, psychology, politics, philosophy, communication sciences, sociology, languages, German, geography, business mathematics, medicine, sports, chemistry, computer science, arts, and history. The survey was completed during the first 15 to 20 minutes of the lectures. In each of the lectures, we randomly distributed three gifts, valued between 5 and 30 Euro and depending on returning a filled survey. Out of 244 responses, 18 participants did not fill out all items required for the analyses and were, therefore, removed from the sample. Further, we identified two participants as outliers who had extreme scores on both leverage and studentized residual when estimating our full models (compare Cohen et al., 2003, on identifying influential outliers).⁴ Our final dataset for hypothesis testing consists of 224 participants, 109 women and 116 men.

3.2 Dependent variable

We measured *dispositional optimism* (OPT) with the revised life-orientation test introduced by Scheier et al. (1994), which has been indicated by Peterson (2000) to clearly reflect the definition of optimism. Among the items there are: “In uncertain times, I usually expect the best” and the

reverse-coded item, “If something can go wrong for me it will.” (Scheier et al. 1994, p. 1073). We utilized a seven-point Likert scale ranging from “completely disagree” to “completely agree.” The scale was translated into German by the first author, a native German speaker fluent in English, and the translated was corrected by the second author, a native English speaker fluent in German. In our data, Cronbach’s alpha is sufficiently high ($\alpha = 0.76$) and the factor analysis shows a single factor with the largest eigenvalue being 2.05 and the second largest being 0.23.

3.3 Independent variables

Control beliefs were measured by Levenson’s (1974) IPC scale, which in contrast to Rotter’s (1966) measurement focuses on first-person evaluations and avoids third-person statements, using the German translation by Mielke (1979). We utilized a seven-point Likert scale ranging from “completely disagree” to “completely agree.” The scale consists of three subscales related to control by oneself, control by other people, and control by chance. Based on results reported by Levenson (1974), Levenson and Miller (1976), Mielke (1979), who report that not all items load on their corresponding subscales or show sufficient correlation with corresponding other items, and based on the observation that research, for example in entrepreneurship (Chen et al., 1998), only utilizes subsets of Levenson’s (1974) items, we excluded 6 items that displayed very low item-rest correlation with the total scale, i.e. below 0.2. The resulting scale, which we refer to as LLOC, shows an acceptable Cronbach’s alpha of 0.79. Additionally we calculated a score CLOC based on the 10 internal and chance-related items used by Chen et al. (1998). Cronbach’s alpha is 0.68.

One could also consider Levenson’s IPC subscales that provide absolute values for

⁴ These two participants were among the five most extreme scores on leverage and among the five most

perceived impacts of internal factors, powerful others, and chance. However, a person might believe more than another person in both internal and external control, which is inconsistent with Rotter's conceptualization. To overcome this problem, we used an alternative score that maps the three factors into one composite factor. Among Levenson's item set there are multiple triples of items that belong to a single topic but ask for the three different types of control (self, others, and chance); for example, "When I get what I want, it's usually because I worked hard for it," "Getting what I want requires pleasing those people above me," and "When I get what I want, it's usually because I'm lucky."⁵ We normalize the response to each item on internal control by dividing it by the sum of all three responses within the corresponding triple (internal, powerful others, and chance), resulting in relative values ranging from 0 to 1 for each item triple. These values are then averaged to reflect a participant's locus of control with values ranging from 1 (internal locus of control) to 0 (external locus of control). Our transformation accounts for the fact that the responses within these items triples might significantly higher correlate with each other than with those items asking for the same source of control in other triples. After re-considering the results reported by Levenson (1974), and by Mielke (1979), which both indicate false loadings and weak items among Levenson's IPC items we selected a subset⁶. The normalized responses to the selected four item triples form a single factor with Cronbach's alpha

extreme scores on studentized residuals.

⁵ According to Rotter's conceptualization, the responses to these different questions should be highly (if not perfectly) correlated – it is therefore unclear whether a factor analysis picks up the negative correlation between internal and external items on one topic or the positive correlation between internal items across topics.

⁶ The selected triplets are: a) I am usually able to protect my personal interests. / People like myself have very little chance of protecting own personal interests when they conflict with those of strong pressure groups. / Often there is no chance of protecting my personal interest from bad luck happenings. b) My life is determined by my own actions. / My life is chiefly controlled by powerful others. / To a great extent my life is controlled by accidental happenings. c) When I get what I want, it's usually because I worked hard for it. / Getting what I want requires pleasing those people above me. / When I get what I want, it's usually because I'm lucky. d) I can pretty

of 0.75, indicating a sufficient internal reliability. We refer to it as NLOC.

For measuring *general self-efficacy*, we used four items from the New General Self-Efficacy (NGSE) scale by Chen et al. (2001) that ask about one's own performance: "When facing difficult tasks, I am certain that I will accomplish them," "If it only depends on my abilities, then I will be successful," "I am confident that I can perform effectively on many different tasks," and "Even when things are tough, I can perform quite well." The excluded four NGSE items focus on achievement of goals, which refers to outcomes and outcome expectancies and could therefore be confounded with control beliefs and outcome expectancies (compare discussion on outcome versus performance by Bandura, 1977, 1997).

The items used to measure *general other-efficacy* are similar in spirit to Suurmeijer's (1982) Social Support Questionnaire (reported in Doeglas et al., 1996), but they were designed for a different response format and refer to more general contexts: "I am always optimistic regarding support from others," "I general, I expect that more people will help than hinder me," "Other people generally have my best interest at heart," and "When confronted with difficult tasks I can count on the help of others."

General chance-efficacy is measured with the following items: "I would never rely on luck," "When my success depends on luck, then I often do better than others would expect," "Even if it depends only on chance, I am still optimistic," and "I would never rely on a lucky accident." These items are similar to items of Darke and Freedman's (1997) belief-in-good-luck-scale, which, however, does not distinguish between efficacy and control (compare empirical results reported in Maltby et al., 2008).

much determine what will happen in my life. / I feel like what happens in my life is mostly determined by powerful

As is the case with the self-efficacy items, our other-efficacy and chance-efficacy items clearly distinguish between efficacy and control beliefs and are clearly distinguished from outcome expectancies. The twelve efficacy items in the questionnaire were intermixed to reduce halo effects, but this procedure can lower between-item correlations. We utilized a seven-point Likert scale ranging from “completely disagree” to “completely agree.”

Running a common factor analysis on all efficacy items with a Promax rotation, we find three factors with eigenvalues above one (2.26, 1.47, and 1.30) with a large gap to the fourth factor (0.35). All items load highest on their corresponding factors and – except for two items in chance efficacy – the loadings exceed 0.55. Cross loadings do generally not exceed 0.2. Cronbach’s alphas are 0.79 for self-efficacy, 0.73 for other efficacy, and 0.63 for chance efficacy. While factor analysis and reliability analysis indicate a weakness of chance-efficacy, an alpha of 0.63 is still acceptable for exploratory research; consequences, most likely an underestimation / attenuation of the associated effect, are addressed in the discussion section.

3.4 Control variables

As *control variables* we include a contrast code for the two lectures (pop = -1 for economic and social history, pop = 1 for inheritance law). In addition, we include age and gender as control variables, as they have been found to affect risk taking behavior (e.g., Dohmen et al., 2011), and as such might also affect perceptions of risk and in turn dispositional optimism.

4. RESULTS

4.1 Summary Statistics

Table 1 reports the summary statistics and correlations for all model variables. Note the

people. / I have often found that what is going to happen will happen.

substantial correlation between self-efficacy (SE) and locus of control (LLOC, CLOC, and NLOC). As expected, the different operationalizations of locus of control are highly correlated (.9) but are not identical. Consistent with Judge et al. (1998), we find that participants with greater self-efficacy also tend to have a more internal locus of control. Depending on the operationalization the correlation varies between 0.43 und 0.5. The correlation between LOC and dispositional optimism (OPT) is between 0.28 and 0.33 depending on the operationalization of LOC, which is consistent with Carver and Scheier (1991), who report values in the upper 20s. As such, our data is generally consistent with prior studies.

Table 1

4.2 Statistical procedures employed for hypotheses testing

To test our hypotheses, we run moderated regression analyses based on the standardized variables measuring locus of control, self-efficacy, other-efficacy, and chance-efficacy, as well as age, the samples indicator, and gender. Results are reported in Table 2. Because all variables that are part of interaction terms are centered and standardized, their main effects can be interpreted as average effects of variables, averaged over all values of the moderating variable locus of control (Cohen et al., 2003).

Due to the substantial correlation between self-efficacy and locus of control, a significant interaction of these constructs could just be a reflection of a quadratic effect of either self-efficacy or locus of control (see Lubinski and Humphreys, 1990). We therefore follow a suggestion by MacCallum and Mar (1995) and control for the quadratic effects of those terms

that form interaction terms. MacCallum and Mar (1995) emphasize that this is a conservative test of the interaction effect. Variance inflation factors below 5.15 and condition indices below 5.49 (excluding the squared effects, the variance inflation factor decreases below 2.28 and the condition index decreases to 2.28) indicate that there is no substantial issue with multicollinearity (Cohen et al., 2003).

For the models used for hypothesis testing, i.e. the full models, the Breusch-Pagan test for heteroscedasticity is insignificant, such that we do not have indications of problems with heteroscedasticity. Further, for residuals in all of these models we cannot reject the normality assumption based the test suggested by D'Agostino et al. (1990). In sum, we feel confident in applying OLS regressions, but additionally we have estimated our models with heteroscedasticity-robust standard errors as well as with bootstrapped standard errors. Further, while no participant's composite score on the dependent variable OPT is at the theoretical minimum (1) or maximum (7), there might still be effects due to range restrictions on single items. We therefore estimated tobit models with rather conservative thresholds 2.5 as a lower threshold (11 censored observations) and 5.5 as the upper threshold (40 censored observations). All robustness checks corroborate our results and conclusions (detailed reports are available upon request).

Table 2

4.3 Hypothesis tests

Hypothesis 1, which states that locus of control positively moderates the relationship between general self-efficacy and dispositional optimism, is consistently supported. For all three

operationalizations of locus of control, the interaction is significant and adds (independent of the order of the inclusion of interaction terms) more than one percent point to the explained variance as it can be expected for interactions of psychometric measurements (Champoux and Peters, 1987) and is comparable to the increase in explained variance for the main effect of locus of control

Hypothesis 2, which, states that locus of control negatively moderates the relationship between general other-efficacy and dispositional optimism is not supported in any of the operationalizations of locus of control. *Hypothesis 3*, however, which states that locus of control negatively moderates the relationship between general chance-efficacy and dispositional optimism is consistently supported. The negative moderation effect of locus of control is therefore only supported for one of two external factors: chance-efficacy. To help ensure the robustness of these findings, we tested if the order in which the interaction terms were entered into the model affected either the significance or the incremental explained variance of the interaction terms. We found no substantial differences in significance or incremental explained variance based on the order to interaction terms.

The top two rows in Figure 2 depict the two moderation effects for the three operationalizations of locus of control. Dispositional optimism is plotted for a range of values (mean plus/minus one standard deviation) of general self-efficacy and chance-efficacy for high values of locus of control (mean plus/minus one standard deviation), keeping the other variables fixed at the average value. Because our estimated models include squared terms of the main effects (see Table 2), the lines exhibit a slight curvature. These graphs demonstrate that a greater self-efficacy is associated with greater optimism if there is a more internal locus of control and – independent of the absolute level of dispositional optimism – associated with higher or lower

levels of locus of control, this interaction reflected by a steeper slope of the line representing the case with more internal locus of control (mean plus one standard deviation) compared to the case with less internal locus of control (mean minus one standard deviation). Similarly, the plots illustrate that a greater chance-efficacy is associated with greater optimism if there is a less internal locus of control. In other words, the positive effect of higher efficacy associated with a source of optimism is greater if the source is believed to be in control of one's life and diminished or even absent if the source not believed to be in control of one's life.

Carver and Scheier (1991) argue that despite being related to dispositional optimism, locus of control is not a substantial driver. Comparing the increments in explained variance between locus of control and the moderation effects of locus of control in Table 2 (Block 3 vs. Blocks 5, 6 and 7) indicates that the influence of locus of control is predominantly indirect via moderation effects. Despite that the moderation effects are entered after the main effect, which conservatively implies that shared variance is attributed to the main effect only, the interaction terms' joint increase in explained variance (Block 5, 6 and 7) is consistently greater than the incremental variance explained by the main effect of locus of control (Block 3).

5 DISCUSSION AND CONCLUSIONS

5.1 Summary

The starting point for this article was Bandura's (1997) insight regarding the moderation effect of perceptions of control on self-efficacy with respect to outcome expectations. First, consistent with corresponding conceptualizations of control and efficacy beliefs by Scheier and Carver (1987), Rotter (1975), and Skinner (1996), we extended this moderation argument to higher-level general counter-parts of Bandura's context-specific beliefs. Second, consistent with

Skinner's (1996) suggestion that efficacy beliefs can not only be defined for the self but also for other factors, we hypothesized a negative moderation effect of internal locus of control on general external-efficacy beliefs, which are split into general other-efficacy (instrumental social support) and general chance-efficacy beliefs.

Testing our hypotheses based on a sample of 224 students, we have found support for two out of three moderation hypotheses. While the moderation effects of locus of control on self-efficacy and chance-efficacy were supported, the moderation effect of locus of control on other-efficacy was not supported.

5.2 General other-efficacy and locus of control

Surprisingly, we did not find support of our hypothesis for a negative moderation effect of locus of control on other-efficacy. Nevertheless, a moderation effect of locus of control on chance-efficacy has been found. These findings re-iterate Levenson's (1974) and Levenson and Miller's (1976) observation that expectations about others are – despite being beliefs about external factors – qualitatively different from beliefs about nature and chance.

Our post-hoc interpretation of our insignificant result relates to what Bandura (1997) refers to as proxy control, where “people try to get those who wield influence and power to act on their behalf to effect the changes they desire.” (1997, p. 17) Engaging in such proxy control is, for instance, of central importance for social activists (compare Levenson and Miller, 1976). Out of this reasoning arises a caveat to our theoretical argument about locus of control and other-efficacy: for individuals exerting proxy control, it is not the a priori belief about the efficacy (i.e. helpfulness) of others that matters, because obtaining favorable outcomes depends on one's own ability to convince others to act in one's own favor. If engaged in proxy control, it is not clear whether people consider this internal or external control. These ambiguities surrounding control

by other people might have motivated Chen et al. (1998) to focus on internal versus chance-control when measuring internal versus external control.

Future research should further develop constructs and measures of locus of control in order to disentangle control by other people that is internalized and control by other people that is not internalized. Such a development might relate locus of control by other people to constructs of social influence and social power (compare French and Raven, 1959). Such developments might not only help understanding the effect observed in this study, but might also help to better understand the dynamics of control in firms and institutions, where control by other people is an important source of potentially internalized external control.

5.3 A less positive and possibly negative effect of more internal control

Previous research assumes that perceiving more control is associated with more optimistic outcome expectancies (compare Weinstein, 1980). When temporally stable and generalized across contexts, control beliefs or related constructs were suggested and empirically shown to be positively associated dispositional optimism (compare Weinstein, 1980; Seligman, 1992, Carver and Scheier, 1991). Our two moderation arguments can shed some new light on the correlation between locus of control and dispositional optimism.

First, consistent with Bandura's (1997) statement that controllability affects the extent to which efficacy beliefs affect outcome expectancies, we find that locus of control substantially moderates the effects of general self-efficacy and general chance-efficacy on optimism. Therefore, the explanatory power of locus of control is likely to be underestimated if one focuses on main effects only (compare Carver and Scheier, 1991, on optimism, but also Spector, 1997, on job satisfaction). Based on our arguments and empirical findings, it seems more promising to

follow research such as Chen et al. (2004) focusing on the moderating influences of locus of control.

Second, the overall relationship of locus of control with dispositional optimism is the sum of the direct effect and its indirect moderation effects. Due to the moderation effects, the overall relationship of locus of control and dispositional optimism depends on the levels of self-efficacy and external-efficacy beliefs. In our data, only the moderation effects on self-efficacy and on chance-efficacy are significant. If the effect due to the negative moderation on chance-efficacy is sufficiently strong compared to the positive moderation of self-efficacy and a possibly positive main effect (which is if self-efficacy is relatively low but chance-efficacy is relatively high), then we can find a negative relationship between locus of control and dispositional optimism. On the contrary, if the positive moderation on self-efficacy is sufficiently strong compared to the negative moderation on chance-efficacy (which is if self-efficacy is relatively high but chance-efficacy is relatively low), then we are likely to find an especially strong positive relationship between locus of control and dispositional optimism. If both sources of optimism are equally evaluated, then a difference in control does not make much of a difference.

The bottom row in Figure 2 illustrates these situations by plotting the relationship between locus of control and dispositional optimism for different levels of general self-efficacy and general chance-efficacy (we fix other-efficacy at the sample average as it is not moderated by locus of control). We clearly observe the expected relationships. Table 2 reports a post-hoc test of the significance of the slope for the two extreme cases (due to non-linearity conditioned on the average level of LOC), both are significant. Therefore, the theorized and empirically supported interaction effects between efficacy and control beliefs can also be used to identify situations when more internal control is more positively or more negatively associated with

dispositional optimism.

5.4 The core evaluations approach and our three types of general efficacy beliefs

There are related frameworks decomposing beliefs about the world into rather general classes of beliefs. Most recently and building on Rokeach's (1968) belief system, Judge and colleagues (1997, 1998) introduced the concept of *core evaluations*, which represent "fundamental, subconscious conclusions individuals reach about themselves, other people, and the world" (Judge et al., 1998, p.18). While our system of general efficacy and control beliefs focus on the same three basic dimensions, our framework reflects a slightly more specific conceptualization than core evaluations. While core evaluations combine self-efficacy, control as well as self-esteem into a single factor, our framework highlights the distinction between efficacy and control beliefs. Furthermore, Judge et al.'s (1998) measurement of external core evaluations refers to beliefs that generalize beyond the own person, e.g. "It is possible to attain happiness in this world." In contrast, our external-efficacy beliefs focus on the individual.⁷ In sum, our approach is an alternative to Judge et al.'s (1997) core evaluation approach; it is more focused and enables the investigation of more specific questions and mechanisms.

5.5 Limitations

Our study is not without limitations. Our self-reported, cross-sectional survey design could be subject to errors resulting from consistency, priming, and problems associated with common method variance (Podsakoff et al., 2003). Siemsen and colleagues (2010) show that a correlation of measurement errors of dependent and independent variables cannot create

artificially significant interactions but instead weaken interaction effects. As claimed for other studies (compare Schaubroeck et al., 2000; van Yperen and Hagedoorn, 2003), our main findings related to moderation and interaction effects should therefore be robust to common method variance, and the estimated effect sizes might even be weakened by common method variance, leading to even more conservative estimates.

Further, our findings could be confounded by issues related to the measurement of our variables. As long as our measurement instruments are only subject to random errors and measure the construct they are supposed to measure, measurement errors lead to conservative tests underestimating the effect sizes and, thus, make it more difficult to find an effect (Cohen et al., 2003). This holds especially true for interaction effects, where the measurement errors associated with each of the interacting variables is multiplied and thus is leveraged (Champoux and Peters, 1987). The resulting attenuation is a reason for not expecting large effect sizes for interaction effects (Champoux and Peters, 1987). While our scales are subject to measurement errors, especially the items related to chance-efficacy, our results indicate the appropriateness of these theoretical distinctions and should encourage researchers to further develop these measurement instruments or use alternative instruments.

Measurement errors and resulting attenuated coefficients are just one facet of the more general problem of endogeneity, which refers to a correlation between the dependent variable and the error terms of the independent variables. Other sources of endogeneity include omitted variables that correlate with independent variables in model and inverse causality or simultaneity of dependent and independent variables. Given our theoretical framework, we are not aware of

⁷ In our framework the previous statement from Judge et al. (1998) would need to be adjusted as follows:

omitted constructs that could be theoretically motivated and through their omission could constrain our results. On the contrary, we could argue that general beliefs depend on age and gender, such that the general beliefs might not be independent from these demographic variables. Based on our belief structures framework and relaxing the assumption that these beliefs are relatively stable over a life time, it might even be more accurate to exclude these demographic control variables. The observed correlations between control variables and general beliefs, however, are small and insignificant, and excluding these control variables does not change our findings.

By selecting dispositional optimism as dependent variable in our regression analyses we follow theorists (Bandura 1977, 1997) and empirical researchers (compare Weinstein 1980; Ajzen, 2002; Chen et al., 2004, Chen et al., 1998) in assuming that efficacy and control beliefs are not affected by affect outcome expectancies or intentions and behavior. However, inverse or reciprocal causality could also be reasonably theorized (see discussion below and compare Anderson, 1977, and Abramson et al., 1978). In order to handle the potentially reciprocal causality in regression analyses, future studies can shed further light on the studied dependencies by employing longitudinal data in ways similar to Anderson (1977). Experimental methods that are frequently employed to overcome problems in identifying causality are less useful in this context, because general beliefs are less likely to be effectively manipulated within an experiment spanning just a very limited time horizon.

5.6 Implications

This study makes two contributions to literature. First, it contributes to research on

relationships between general beliefs and expectancies, and in particular general self-efficacy, social support, belief in good luck, locus of control and dispositional optimism. Following Scheier and Carver (1987), who proposed that individuals might be optimistic for different reasons, such as high self-efficacy or believing in good luck, we show that dispositional optimism is systematically related to general beliefs about the efficacy of internal factors (self-efficacy) and external factors (other-efficacy and chance-efficacy).

For different individuals, the strength of the interrelationships between these factors may vary. One reason for this can be found in the moderation hypothesis suggested by Bandura (1977, 1997), which proposes that the strength of these relationships depends on locus of control. This perspective also sheds new light on the relationship between locus of control and dispositional optimism, a relationship that researchers do not have reached a consensus about (compare Burger, 1989; Carver and Scheier, 1991). We show that this relationship is less positive or even negative, if external-efficacy beliefs are lower and self-efficacy is higher. Our research suggests that there is a sort of a balance between general beliefs which requires more in-depth research.

Despite being relatively robust, general beliefs may also change, either during infancy (Rotter 1966, Peterson, 2000), due to repeated experiences as described in the literature on learned helplessness or learned optimism (compare Abramson et al. 1978, Seligman, 1992; Peterson, 2000), or due to sudden and fundamental (traumatic) experiences. While our cross-sectional research design only allows us to identify correlational structures, causal relationships between these constructs are likely. While Bandura (1977, 1997) clearly outlines that self-efficacy beliefs affect outcome expectancies and a substantial number of studies implicitly make this assumption, an inverse causality could also be theorized. Based on a longitudinal analysis

Anderson (1977) identified a dynamic reciprocal relationship between locus of control and performance. If people's beliefs about outcomes at least partially related to their actual performance, then such a reciprocal relationship could exist also for locus of control and beliefs about outcomes. Further, an individual may learn from experienced outcomes about their strengths and capabilities, but he or she may also learn that they are more or less helpless and out of control (compare discussion on explanatory style by Abramson et al., 1978). They may also attribute negative outcomes to external factors and thereby become convinced that other people or chance do not play in their own favor. Note, however, that independent of the causality the same kind of correlation is created: a correlation between the belief about the dominant (controlling) driver of outcomes and the outcome expectancy.

Second, our study indirectly contributes to research linking dispositional optimism to people's behavior, and in particular to engaging in and succeeding at challenging goals. For example, previous research has shown that dispositional optimism is not only related to remarrying, to working harder, and to more risky investment strategies (Puri and Robinson, 2007); but also to being more charismatic, to experiencing better job search outcomes, to spending less effort on job search but also to being offered jobs more quickly (Kaniel et al. 2010). Optimism can also enhance performance if it causes affect and emotions that support performance (compare Compte and Postlewaite, 2004).

More importantly with respect to our study, optimism is also related to active coping (Scheier and Carver, 1987; Solberg Nes and Segerstrom, 2006). If dispositional optimism can result from different causes, then we argue that also the coping behavior is likely to vary despite being equally optimistic. If an individual believes that he or she is in control and is optimistic because of higher self-efficacy, then more effort might help to increase the perceived chances for

success even further – an example of an active coping response. This argument is vital to Bandura's (1997) thoughts on how self-efficacy helps motivating people. In the context of entrepreneurship, which is generally associated with higher internal control (Locke and Baum, 2007), Markman et al. (2005) find that individuals scoring higher in self-efficacy are more likely to persist in the face of adverse events and exert more effort in order to succeed.

We would similarly expect that if individuals who are optimistic due to belief in good luck would also persist, but their optimism will not necessarily correspond to more effort. In this case, an individual might just wait for the lucky accident, which represents passive persistence. Both the actively coping and the passively coping individual are persistent because they are optimistic, but their coping behavior differs due to the structure of beliefs associated with their optimism. Therefore, if we can better understand the underlying structure of an individual's optimism, we should be able to better understand why equally optimistic individuals behave differently.

5.7 Conclusions

This study establishes the existence of a specific belief structure that is related to dispositional optimism. We illustrate that dispositional optimism – as hypothesized by Carver and Scheier (1987) – can indeed be related to different sources. Specifically, we extend Bandura's thoughts on a context-specific moderation of self-efficacy by control beliefs general self-efficacy beliefs and general locus of control as well as to general beliefs about the efficacy of external factors. We expand existing research by reporting empirical support for an interaction of self-efficacy and locus of control with respect to dispositional optimism. Further, this study is the first to explicitly hypothesize and empirically identify a negative moderation of general

external-efficacy beliefs, in particular the efficacy of chance, by general locus of control. By finding divergent results for general beliefs about the efficacy of others, we re-iterate the call that external factors are not homogeneous and researchers should at least differentiate external factors with respect to powerful other people, on one hand, and chance and nature, on the other hand.

In addition, this study expands research on the relation between locus of control and dispositional optimism by illustrates why individuals with an internal locus of control can be *less optimistic* or *more pessimistic* than those with an external locus of control. While our study focuses on a correlational structure, we discuss that our hypotheses is consistent with various directions of causality, from efficacy and control beliefs to dispositional optimism and vice versa. We argue that the observation that an individual's optimism can causes (or be linked) to very different beliefs about self-efficacy and external efficacy beliefs has implications for understanding how people persist in the face of adverse events. Optimism might drive them to persist, but the different underlying beliefs regarding sources of efficacy and control may distinguish between active and passive coping. In summary, research on consequences of dispositional optimism can benefit from considering not only the overall level of dispositional optimism, but also the underlying belief structure as outlined and developed in this article.

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TABLE 1
Correlations and summary statistics

	1	2	3	3	4	5	6	7	8	9
Mean	4.50	5.12	4.88	.46	5.11	4.56	3.76	21.30	0.51 ¹⁾	0.54 ²⁾
Std.	1.00	.65	0.66	.08	.80	1.03	1.07	2.08	-	-
1 OPT	1									
2 LLOC	0.34	1								
3 CLOC	0.33	0.87	1							
3 NLOC	0.28	0.92	0.82	1						
4 SE	0.43	0.49	0.50	0.43	1					
5 OE	0.37	0.10	0.15	0.10	0.13	1				
6 CE	0.37	-0.06	-0.13	-0.06	0.08	0.06	1			
7 Age	0.06	0.02	0.01	0.05	0.09	-0.12	-0.04	1		
8 Male	-0.01	-0.04	-0.04	-0.07	0.12	-0.09	-0.05	0.16	1	
9 Population	0.00	-0.06	-0.05	-0.09	0.02	-0.01	0.09	-0.00	0.01	1

Notes. N = 224, Significance levels, $p < 0.05$ for values above 0.132, $p < .01$ for values above 0.173, and $p < 0.001$ for values above 0.221

¹⁾ Dichotomous variable, share of males, 1-0.51 is the share of females

²⁾ Dichotomous variable, share of students from lecture on economic and social history, 1-0.54 is the share lecture on inheritance law

TABLE 2
OLS regression analyses of general beliefs on dispositional optimism using different operationalizations of locus of control

LOC operationalization	LLOC	CLOC	NLOC
Constant	0.05 (0.08)	0.03 (0.08)	0.02 (0.09)
Control variables			
Gender contrast (f: -1, m: +1)	-0.01 (0.05)	-0.03 (0.05)	-0.02 (0.06)
Age (standardized)	0.08 (0.05)	0.08 (0.05)	0.07 (0.05)
Population contrast (-1 vs. +1)	-0.03 (0.05)	-0.04 (0.05)	-0.02 (0.05)
R ² (block 1)	0.004 (0.32)	0.004 (0.32)	0.004 (0.32)
Main effects			
Self-efficacy (standardized) SE	0.30 (0.07)***	0.28 (0.07)***	0.30 (0.06)***
Other-efficacy (standardized) OE	0.32 (0.06)***	0.30 (0.06)***	0.31 (0.06)***
Chance-efficacy (standardized) CE	0.33 (0.05)***	0.34 (0.05)***	0.33 (0.05)***
R ² (block 2)	0.393 (47.18)***	0.393 (47.18)***	0.393 (47.18)***
Locus of control (standardized) LOC	0.11 (0.06)	0.12 (0.06)	0.12 (0.06)*
R ² (block 3)	0.015 (5.50)*	0.029 (10.59)*	0.022 (8.06)**
Controlling for squared effects			
SE x SE	-0.06 (0.05)	-0.08 (0.05)	-0.04 (0.04)
OE x OE	-0.01 (0.04)	-0.04 (0.04)	-0.02 (0.04)
CE x CE	0.04 (0.04)	0.02 (0.04)	0.03 (0.04)
LOC x LOC	-0.12 (0.05)**	-0.09 (0.05)	-0.08 (0.04)
R ² (block 4)	0.004 (0.39)	0.004 (0.39)	0.007 (0.68)
Interaction effects			
LOC x SE	0.22 (0.08)**	0.24 (0.08)**	0.18 (0.07)**
R ² (block 5)	0.016 (6.06)*	0.022 (8.60)**	0.019 (7.32)**
LOC x OE	0.04 (0.05)	0.09 (0.05)	0.03 (0.06)
R ² (block 6)	0.000 (0.00)	0.003 (1.34)	0.000 (0.11)
LOC x CE	-0.13 (0.06)*	-0.19 (0.05)***	-0.15 (0.06)*
R ² (block 7)	0.018 (6.72)*	0.031 (12.45)***	0.013 (5.19)*
N	224	224	224
Total R ² (F value)	0.451 (12.25)***	0.487 (14.17)***	0.459 (12.69)***
Adjusted Total R ²	0.414	0.453	0.423
Post-hoc tests: Linear combinations ²⁾			
a) LOC + LOCxSE – LOCxCE	0.46 (0.11)***	0.55 (0.10)***	0.45 (0.11)***
b) LOC – LOCxSE + LOCxCE	-0.23 (0.13) ¹⁾	-0.30 (0.13)*	-0.20 (0.11) ¹⁾

Notes: Models differ with respect to the operationalization of locus of control. Coefficients reported for the full model. Standard errors reported in parentheses. Delta R-squared reported based on hierarchical regression. Significance levels: * p < 0.05, ** p < .01, *** p < 0.001.

1) significant at the 10% level

2) Test marginal effect of LOC for average level of LOC and a) high levels of SE (+1 S.D.) and low levels of CE (-1 S.D.) and b) low levels of SE (-1 S.D.) and high levels of CE (-1 S.D.)

Figure 1

Conceptual framework and visualized hypotheses

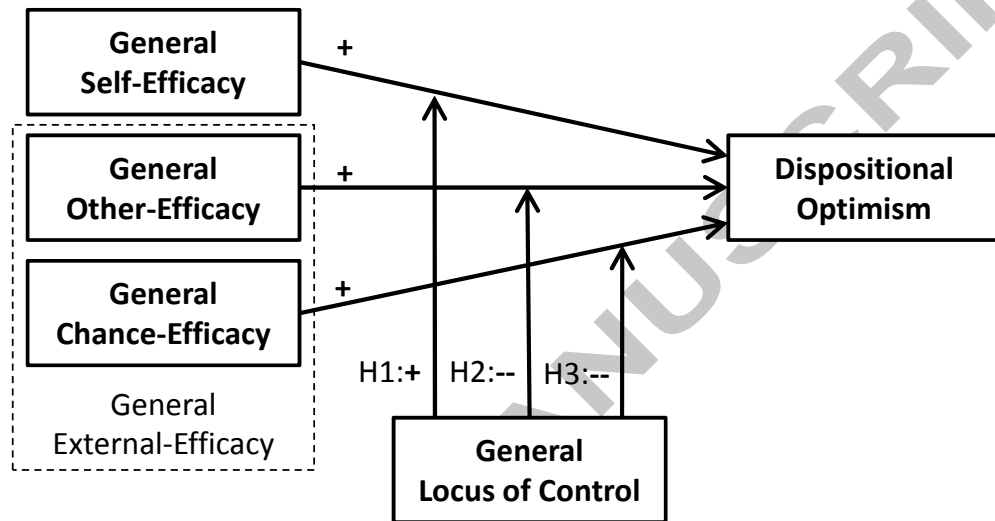
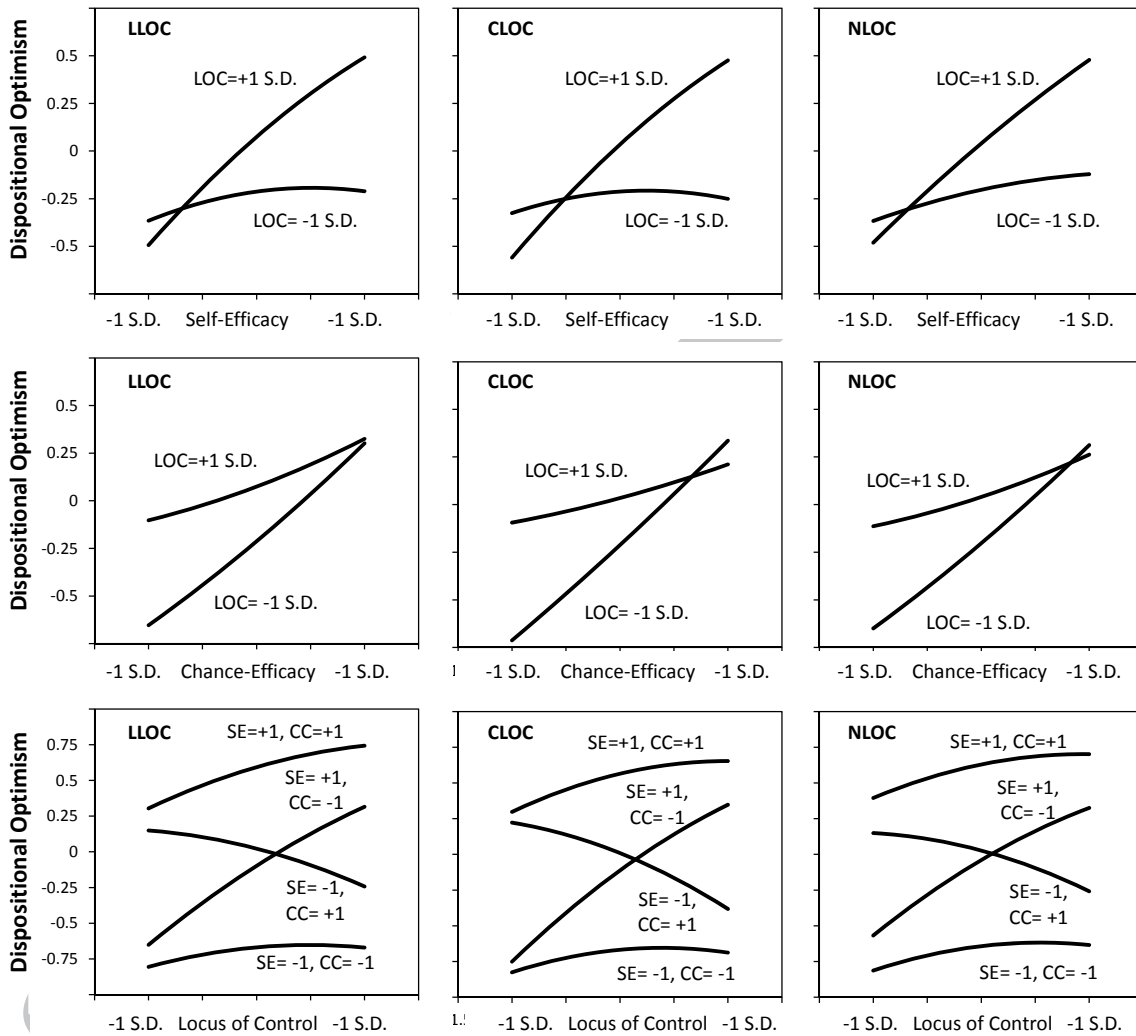


Figure 2

Interaction plots for the effects of locus of control (in the three operationalizations) and efficacy beliefs on dispositional optimism



Highlights

We study general efficacy beliefs as sources of dispositional optimism.

We consider self-efficacy, other-efficacy (social support), and chance-efficacy.

Internal control enhances the relationship between self-efficacy and optimism.

Internal control diminishes the relationship between chance-efficacy and optimism.

We identify conditions for a negative association of internal control and optimism.