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Flow Experience as Consequence and Self-Determination as Antecedent of Congruence between Implicit and Explicit Motives

Kaspar Philipp Schattke

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Vorsitzende:		Univ.-Prof. Dr. Claudia Peus
Prüfer der Dissertation:	1.	Univ.-Prof. Dr. Hugo M. Kehr
	2.	Prof. Dr. Veronika Brandstätter-Morawietz Universität Zürich/Schweiz

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Dedication

To my beloved Gen

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Flow Experience as Consequence and Self-Determination as Antecedent of Congruence between Implicit and Explicit Motives

0. Abstract

Flow experience is a state of optimal motivation in which people get fully absorbed by a smoothly running activity that they pursue for the sake of it and without extrinsic rewards (Csikszentmihalyi, 1975). According to the compensatory model of motivation and volition (Kehr, 2004b) and in concordance with the classical approach to motivation, the basic precondition for flow experience is that the incentives provided by the current activity arouse one's implicit motives. Furthermore, people are more likely to experience flow if their implicit and explicit motives are congruent with each other because those with high motive congruence are more likely to engage in activities with fitting activity-related incentives than those with low motive congruence. If motive congruence fosters flow experience, one might wonder what leads to motive congruence. Thrash and Elliot (2002) argue that self-determination may be a possible antecedent of motive congruence. In this regard, we conducted three studies.

Study 1 examines indoor wall climbers' flow experience on four routes that differed in terms of achievement-related incentive strength. The results of this field experiment demonstrate that climbers with a high implicit achievement motive experience more flow on routes with strong achievement-related incentives than on routes with weak achievement-related incentives.

Study 2 examines indoor wall climbers' increase of flow experience from a route with weak achievement-related incentives to a route with strong achievement-related incentives. The results of this field study demonstrate that achievement motive congruence predicts the flow increase, but only if climbers perceive the climbing activity as strongly achievement-related.

Study 3 examines the impact of childhood experiences on motive congruence in adulthood. The results of this archival longitudinal study demonstrate that the experience of self-determination in childhood is associated with motive congruence 26 years later.

The findings support the compensatory model of motivation and volition and suggest that raising children in a way that promotes self-determination supports the development of motive congruence. This will help them to engage in activities that arouse their implicit motives and which will therefore enhance flow experience, the state of optimal motivation.

Flow Erleben als Konsequenz und Selbstbestimmung als Voraussetzung für Kongruenz zwischen impliziten und expliziten Motiven

Zusammenfassung

Flow-Erleben ist ein Zustand optimaler Motivation, in dem Menschen völlig in einer glatt laufenden Tätigkeit aufgehen, die sie um ihrer selbst willen ausführen, ohne extrinsische Belohnungen zu erwarten (Csikszentmihalyi, 1975). Nach dem Kompensationsmodel der Motivation und Volition (Kehr, 2004b) und in Übereinstimmung mit dem Paradigma der klassischen Motivationspsychologie ist die Grundvoraussetzung für Flow-Erleben, dass Tätigkeitsanreize die eigenen impliziten Motive anregen. Darüber hinaus kommen Menschen eher in den Flow-Zustand, wenn ihre impliziten und expliziten Motive kongruent sind, da Menschen mit hoher Motivkongruenz eher Tätigkeiten mit passenden Anreizen aufsuchen als Menschen mit geringer Motivkongruenz. Wenn Motivkongruenz das Flow-Erleben fördert, führt dies zu der Frage, was wiederum Motivkongruenz bedingt. Thrash und Elliot (2002) argumentieren, dass dispositionale Selbstbestimmung eine mögliche Voraussetzung für Motivkongruenz ist. Wir haben diesbezüglich drei Studien durchgeführt.

Studie 1 untersucht das Flow-Erleben von Hallenkletterern auf vier Kletterrouten, die sich in der Stärke ihrer Leistungsanreize unterscheiden. Die Ergebnisse dieses Feldexperiments zeigen, dass Kletterer mit einem hohen impliziten Leistungsmotiv mehr Flow auf Routen mit starken als mit niedrigen Leistungsanreizen erleben.

Studie 2 untersucht den Zuwachs an Flow-Erleben von einer Route mit schwachen Leistungsanreizen zu einer Route mit starken Leistungsanreizen. Die Ergebnisse dieser Feldstudie zeigen, dass Leistungsmotivkongruenz den Flow-Zuwachs vorhersagt, aber nur wenn die Kletterer die Tätigkeit als leistungsthematisch erleben.

Studie 3 untersucht den Einfluss von Kindheitserfahrungen auf Motivkongruenz im Erwachsenenalter. Die Ergebnisse dieser Längsschnittstudie zeigen, dass das Erleben von Selbstbestimmung in der Kindheit mit Motivkongruenz 26 Jahre später zusammenhängt.

Die Befunde stützen das Kompensationsmodell der Motivation und Volition und legen nahe, dass es die Entwicklung von Motivkongruenz fördert, Kinder in einer Art und Weise groß zu ziehen, welche die Selbstbestimmung fördert. Motivkongruenz wird ihnen dabei helfen, Tätigkeiten aufzusuchen, welche die eigenen impliziten Motive anregen und damit das Flow Erleben, den Zustand optimaler Motivation, fördern.

1. Introduction

“If we are so rich, why aren't we happy?” (p. 821) asks Csikszentmihalyi (1999). According to him, we do not achieve happiness from material rewards but from experiencing the state of flow frequently throughout our lives. Flow is a state of optimal experience (Csikszentmihalyi, 1990) and associated with better performance (i.e., Engeser, 2005), increased creativity (i.e., Csikszentmihalyi, 1997a), and positive affect (i.e., Schüler, 2007). “Flow is a special case of intrinsic motivation” (Kehr, 2004b, p. 490) in which we pursue an activity for the sake of the activity itself without expecting external rewards such as money or prestige (Csikszentmihalyi, 1975; Rheinberg, 2008a).

When do we pursue activities for the sake of it? According to Kehr (2002, 2004b) and Rheinberg (2002, 2008a), this is the case for activities that satisfy our emotional needs and fit our affective preferences. Rheinberg (2002, 2008a) describes people who engage often in those kinds of activities as motivationally competent or motive-congruent people. Besides enhancing flow experience (Schüler, 2010), motive congruence further promotes goal pursuit (Brunstein, Schultheiss, & Grässmann, 1998), life satisfaction (Hofer & Chasiotis, 2003), and well-being (Schüler, Job, Fröhlich, & Brandstätter, 2008). This raises the question of how motive congruence develops.

According to Thrash and Elliot (2002), self-determination strengthens motive congruence. People with strong self-determination are ‘‘attuned to the needs of the self, and use this knowledge in deciding whether to accept or reject forces that impinge on the self, such as impulses and social pressures’’ (p. 732). Furthermore, Thrash, Elliot, and Schultheiss (2007) propose that parents should be able to foster motive congruence by enhancing their children’s experiences of self-determination.

The above outline entails three questions this research aims to answer empirically. First, do people experience more flow in situations that fit their affective preference than in situations that do not? Second, does motive congruence lead to flow experience? Third, does self-determination foster motive congruence as suggested by Thrash and colleagues (2007)?

We begin with explaining the classical approach to motivation and introduce the compensatory model of motivation and volition (Kehr, 2004b). We then review the literature on flow experience, motive congruence, and self-determination in relation to motive congruence and point out our research questions. Next, we summarise the research questions and explain the three related studies. After describing each of the three studies and their results, we discuss the research in light of our theoretical considerations.

1.1. The Classical Approach to Motivation

Motivation is a result of the interaction between person and situation that leads to behaviour (Lewin, 1946; Rheinberg, 2008b). This is the basic concept of the classical approach to motivation (see *Figure 1*). According to Rheinberg (2008b), "motivation can be defined as the activating orientation of current life pursuits toward a positively evaluated goal state" (Rheinberg, 2008a, p. 329). In other words, motivation activates or energises strivings for particular objects or activities and guides them into a certain direction. Motivation is not the same as behaviour but motivation makes behaviour much more likely to occur. For example, someone who is motivated for doing sports might have an *urge* to climb a wall but will not necessarily do so. However, he or she will be more likely to actually go climbing than someone who is not motivated for doing sports. This leads to the question of where the motivation comes from.

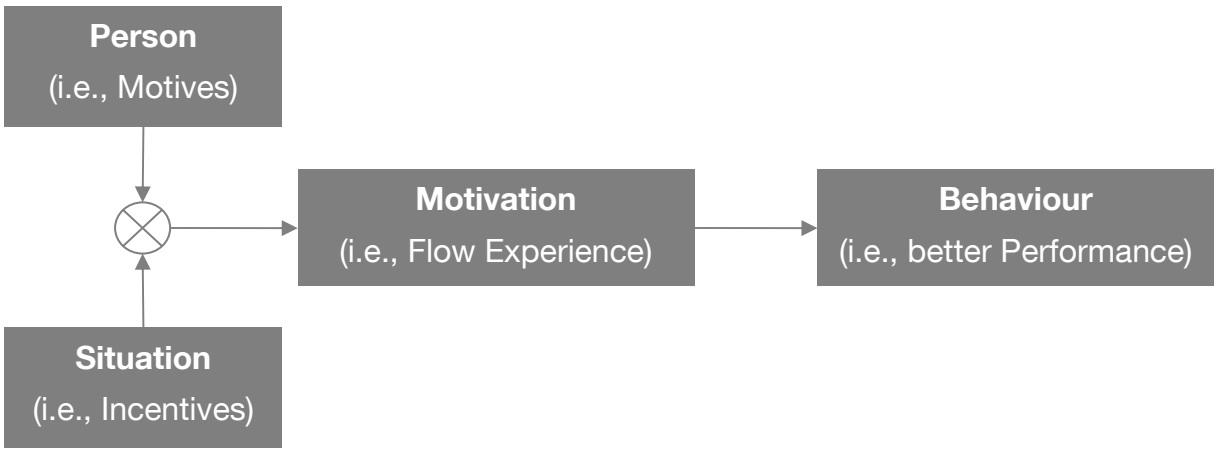

Figure 1. The Classical Approach to Motivation. The interaction between personal and situational variables such as motives and incentives lead to motivation. Motivation, in turn, leads to behaviour. Adapted from Rheinberg (2008b).

According to the classical approach to motivation, *person* and *situation* need to interact with each other - this interaction leads to motivation. In this approach, the term *person* means individual differences, e.g., traits, schemas, and motives (McClelland, 1951; McClelland, Koestner, & Weinberger, 1989). The term *situation* refers to stimuli, cues, and incentives provided by the environment. Different situations provide different incentives. People differ in how attractive they find those incentives. When incentives fit the person's motive configuration, this person becomes motivated. Hence, motivation has been called the "linchpin" between person and situation (Schultheiss, Kordik, Kullmann, Rawolle, & Rösch, 2009).

1.1.1. Incentives. As stated above, incentives are situational stimuli or cues provided by the environment and have an impact on motivation. “Every positive or negative outcome that a situation can promise or signal to an individual is called “incentive” and has “demand characteristics” for an appropriate action” (Heckhausen & Heckhausen, 2008, p. 4). This means that incentives activate anticipations of cognitive or emotional outcomes in situations. Furthermore, “incentives may be associated with the action itself, its outcome, or various consequences of an action outcome” (Heckhausen & Heckhausen, 2008, p. 4). This indicates that the incentive can lie in the outcome of a situation or in the activity itself. Therefore, an important distinction to make is between incentives that are purpose-related (Heckhausen & Rheinberg, 1980) versus those that are activity-related (Koestner, Weinberger, & McClelland, 1991; Rheinberg, 1989; Schüler & Engeser, 2009).

Someone who acts because he or she wants to attain certain consequences, which succeed a successfully accomplished activity, acts because of purpose-related incentives. For example, a wall climber climbs a very difficult route (activity) in order to become famous and to impress other people (consequences). In this example, the purpose of the activity is to become famous and to impress others. Hence, the incentives lie in the consequence of the action and not in the activity itself (Schattke, Seeliger, Schiepe-Tiska, & Kehr, 2011). According to Rheinberg (2008a, 2008b), purpose-related incentives are associated with extrinsic motivation.

However, someone who acts because he or she wants to enjoy the activity just for the sake of it, without focussing on the consequences, acts because of activity-related incentives. For example, a wall climber climbs a very difficult route (activity) because he or she enjoys the challenge. In this example, the purpose of the activity is to enjoy climbing and the associated challenges in doing so. Thus, the incentives lie in the activity itself (Schattke et al., 2011). Csikszentmihalyi (1990) refers to these kinds of activities as *autotelic activities,* which are associated with flow experience and intrinsic motivation (Rheinberg, 2008a, 2008b).

1.1.2. Motives. People might react to the same incentives in different ways because they differ in their degree of attraction to them. In other words, people have preferences for certain incentives. McClelland (1980) defines *motive* as a relative stable preference for a specific class of incentives. Furthermore, these preferences for certain classes of incentives are affectively charged. This means that obtaining those incentives has affective consequences. For example, someone who has a stable preference for challenges (achievement motive) will enjoy climbing the challenging route and might be proud of mastering those challenges encountered on the route. The anticipation of the

affect when encountering an incentive motivates people to obtain this incentive. However, someone who does not anticipate a positive affect will not be motivated by the incentive and hence will not possess the respective motive (McClelland, 1987; Schmalt & Langens, 2009).

The above discussion points out that a motive is a recurrent concern with a certain class of incentives (McClelland, 1987). In the literature, three classes of incentives have been discussed intensively, namely, the "big three motives" for achievement, power, and affiliation (McAdams, 2009; McClelland, 1987; Schultheiss, 2008; Schultheiss & Brunstein, 2010).

1.1.2.1. The Achievement Motive. The core of the achievement motive is to hit a certain standard of excellence (McClelland, Atkinson, Clark, & Lowell, 1953). Hence, "doing something better is the natural incentive for the achievement motive" (McClelland, 1987, pp. 227–228). Achievement-motivated people like challenging tasks on a medium level of difficulty. They strive for perfection and efficacy and they enjoy experiencing increasing personal skills (Pang, 2010b). People with a high achievement motive prefer working on their own because they want to feel responsible for the outcome of their work (Brunstein & Heckhausen, 2008; Schultheiss, 2008). Additionally, tasks in which one can obtain frequent feedback motivate people with a high achievement motive. This is particularly true for feedback with reference to an individual norm rather than a social norm (Brunstein & Hoyer, 2002; Brunstein & Maier, 2005).

1.1.2.2. The Power Motive. In contrast, power-motivated people like to impress, gain impact, and control others (Fodor, 2010; McClelland, 1975; Veroff & Veroff, 1972; Winter, 1973). On the one hand, they are able to adapt behaviours very quickly, which are useful in order to dominate others. On the other hand, they can abandon behaviours equally quickly - behaviours which have been associated with being defeated by others in the past (Schultheiss, 2008). People with a high power motive are attracted to prestigious goods such as big cars or jobs where they can be the centre of attention (Schmalt & Heckhausen, 2008).

1.1.2.3. The Affiliation Motive. Finally, people with a high affiliation motive enjoy establishing, maintaining, and restoring positive relations with others (Atkinson, Heyns, & Veroff, 1958; Weinberger, Cotler, & Fishman, 2010). They foster friendships and like being with others. Affiliation-motivated people often join groups for this purpose and usually show cooperative, warm, and friendly behaviours in communities. They want to be in the presence of others who are accepting and friendly (Schultheiss, 2008; Sokolowski & Heckhausen, 2008).

1.2. The Compensatory Model of Motivation and Volition

The above section highlights that motivation results from the interaction between *person* and *situation.* The current section differentiates the person component in more detail using the compensatory model of motivation and volition as a framework (Kehr, 2004b). This model distinguishes three structural components and two functional mechanisms. The structural components are implicit motives, explicit motives, and perceived abilities. The functional mechanisms are problem-solving and volition (Kehr, 2004b). The basic idea of this model is that people are optimally motivated when all three structural components are congruent with each other. In a situation where someone's structural components are incongruent, one needs the functional mechanisms (problem-solving or volition) to compensate for the lack of optimal motivation.

1.2.1. The Structural Components. The next paragraphs explain the three structural components and their relationships with each other in more detail.

1.2.1.1. Implicit Motives. Implicit motives are the first structural component of the compensatory model of motivation and volition (Kehr, 2004b). Implicit motives are unconscious and recurrent preferences or concerns for affectively rewarding experiences related to a certain class of incentives experienced in an activity (Koestner et al., 1991; McClelland et al., 1989; Schultheiss & Brunstein, 2010). These classes of incentives are usually achievement-, power-, or affiliation-related. According to the compensatory model of motivation and volition, someone will have affective preferences towards those incentives, if the activity-related incentives of the current situation arouse one's implicit motives. The affective preferences lead to spontaneous behaviour impulses ("I would enjoy doing that") (Kehr, 2004b). In applied settings, Kehr (2002, 2009) refers to affective preferences as the "heart component".

Aroused implicit motives energise behaviour through enjoyment and pleasure. This leads to operant behaviour rather than respondent behaviour. Thus, implicit motives predict spontaneous behaviour as well as behavioural trends over time rather than conscious decisions or short-term behaviour (McClelland et al., 1989). Since implicit motives are affectively based, a positive affect or emotion is the reward for the satisfaction of implicit motives (McClelland, 1987; McClelland et al., 1989). According to Weinberger and McClelland (1990), "each motive has a particular affect associated with it" (p. 568), which has been largely confirmed by emotion theory (Ekman, 1992). Job and Brandstätter (2009) summarise that the arousal of the implicit achievement motive is associated with the experiences of *excitement, interest, and flow*, the implicit power motive with *impact* and *strength*, and the implicit affiliation motive with *joy*, *happiness*, and *pleasure*.

Interestingly, implicit motives develop early in life before language capacities develop, which is the reason why they are rooted non-verbally, affectively, and often unconsciously (McClelland et al., 1989; McClelland & Pilon, 1983). If one is not aware of one's implicit motives, it will be impossible to assess them with self-report measures - such as questionnaires - accurately. Instead, researchers in this domain use projective (operant) measures such as the Picture-Story-Exercise (PSE; Pang, 2010a; Pang & Schultheiss, 2005; Schultheiss & Brunstein, 2001), the Operant-Motive-Test (OMT; Kuhl & Scheffer, 1999; Kuhl, Scheffer, & Eichstaedt, 2003), or the semi-projective Multi-Motive-Grid (MMG; Schmalt, Sokolowski, & Langens, 2000; Sokolowski, Schmalt, Langens, & Puca, 2000). All measures use pictures to arouse the subject's fantasy. After the subjects have seen the pictures, they either write a story (PSE), answer motive related questions (OMT), or choose motive related items that fit with their impression of the picture (MMG). The answers get coded and categorised into different motive domains.

1.2.1.2. Explicit Motives. Explicit motives are the second structural component of the compensatory model of motivation and volition (Kehr, 2004b). Explicit motives are the ones a person thinks he or she possesses. Therefore, Rheinberg (2002, 2008a, 2008b) also refers to them as self-attributed motives. From a broader point of view, the explicit domain also includes goals (i.e., Brunstein et al., 1989; Hofer & Chasiotis, 2003; Rawolle, Kehr, & Glaser, 2008) and values (i.e., Hofer, Chasiotis, & Campos, 2006). Unlike implicit motives, explicit motives are consciously rooted and "usually activated by explicit, often social, incentives such as rewards, prompts, expectations, or demands" (McClelland et al., 1989, p. 693). Explicit motives can also be achievement-, power-, or affiliation-related and are associated with purpose-related incentives (Koestner et al., 1991, McClelland et al., 1989; Rheinberg, 1989, 2008a; Schüler & Engeser, 2009). According to the compensatory model of motivation and volition, the arousal of explicit motives leads to cognitive preferences and explicit action tendencies ("I find this important") (Kehr, 2004b). In applied settings, Kehr (2002, 2009) refers to cognitive preferences as the "head component".

Unlike implicit motives, explicit motives predict respondent behaviour rather than operant behaviour. Thus, explicit motives predict conscious, elaborated decisions and immediate choices (McClelland et al., 1989). Since they are cognitively based, explicit motives lead to a positive evaluation rather than an affect as reward (McClelland, 1987; McClelland et al., 1989). In other words, the accomplishment of a goal or other purpose-related incentives leads to satisfaction but does not lead to an emotional sensation.

Explicit motives develop later in life after language capacities have developed (McClelland et al., 1989; McClelland & Pilon, 1983) and use a rational system, which

operates in the medium of language and abstract symbols (Schultheiss & Brunstein, 1999). Since people are aware of their explicit motives, one can use self-report measures to assess them, for example with the Adjective Checklist (ACL; Gough & Heilbrun, 1965; 1983), the Personality Research Form (PRF; Jackson, 1984), or the recently developed Unified Motive Scales (UMS, Schönbrodt & Dislich, 2011). Various recent studies (i.e., Baumann, Kaschel, & Kuhl, 2005; Hofer, Busch, Chasiotis, & Kiessling, 2006; Job & Brandstätter, 2009; Kehr, 2004a; Koestner et al., 1991; Schattke, Koestner, & Kehr, 2010; Schüler, 2010; Schüler et al., 2008; Thrash & Elliot, 2002) and some meta-analytic research (Köllner & Schultheiss, 2011; Spangler, 1992) demonstrate that implicit and explicit motives usually do not or only weakly correlate with each other and that they predict different outcomes (Brunstein & Hoyer, 2002; Brunstein & Maier, 2005; Spangler, 1992). Thus, several authors argue that implicit and explicit motives represent different aspects of personality (i.e., Brunstein, 2008; McClelland et al., 1989; Spangler, 1992; Thrash, Cassidy, Maruskin, & Elliot, 2010).

1.2.1.3. Perceived Abilities. Perceived abilities are the third structural component of the compensatory model of motivation and volition (Kehr, 2004b). They represent abilities, skills, and action-related knowledge ("I know how to do it"). Perceived abilities represent behavioural scripts that tell us how to perform a specific task or how to accomplish a certain goal. Perceived abilities are similar to the concept of self-efficacy (Kehr, 2004b). Ajzen (1991) and Bandura (1977), for example, demonstrate that self-efficacy is an important component for motivational behaviour. However, Kehr (2004b) concludes that "perceived abilities alone are not sufficient to determine behaviour but may combine with explicit motives to determine task choice and goal setting. Conversely, insufficient perceived abilities do not preclude motivated behaviour" (p. 485). In conclusion, perceived abilities are not as important for motivation as implicit and explicit motives but function as an important moderator. In applied settings, Kehr (2002, 2009) refers to perceived abilities as the "hand component".

1.2.2. Relationships between the Structural Components. Kehr, von Rosenstiel, and Bles (1997) report that the three structural components are independent from each other and influence motivation altogether. More precisely, "behavioral congruence with affective preferences (aroused implicit motives) is a necessary, but not sufficient, condition for intrinsic motivation" (Kehr, 2004b, p. 489). In other words, behaviours in certain activities need to arouse one's implicit motives in order to be intrinsically motivating. In addition, activities need to be congruent not only with affective preferences but also with cognitive preferences (activated explicit motives). The latter is a "sufficient condition for intrinsic motivation" (Kehr, 2004b, p. 489).

For example, someone enjoys sports climbing for the challenge of it. On the climbing wall, the activity of climbing activates the climber's implicit achievement motive, which leads to affective preferences and implicit behavioural impulses; the climber enjoys what he or she is doing. However, if the climber's thesis submission is due the next day, he or she will encounter competing cognitive preferences which will prevent intrinsic motivation because other goals will be more important and distract the person from the actually joyful activity; the cognitive preferences will be incongruent with the climbing activity (Schattke & Kehr, 2009). This leads to a conflict between the implicit and explicit domain and hence impairs intrinsic motivation (Kehr, 2004b). The latter example highlights that – for intrinsic motivation – affective and cognitive preferences do not necessarily have to be in line with each other. However, the affective preferences need to be in line with the activity at hand and *no competing* cognitive preferences should be activated (Kehr, 2005; Schattke & Kehr, 2009).

Finally, when someone is intrinsically motivated and perceives his or her abilities as sufficient for the current activity, this person is optimally motivated and hence very likely to experience flow (Kehr, 2004b). Flow is the state of optimal experience in which people feel absorbed by the activity and in which the activity runs fluently and smoothly (Csikszentmihalyi, 1975). In this sense, the compensatory model of motivation and volition conceptualises "flow experience as a special case of intrinsic motivation" (Kehr, 2004b, p. 490). For example, a novice climber can be intrinsically motivated to master a wall with a difficulty level exceeding this climber's skills or abilities. However, this climber is unlikely to experience flow due to the lack of abilities, knowledge, and experience at that level. The lacking abilities will lead to frequent disruptions and prohibit this person from smooth and fluid proceedings of actions. Thus, it will not be the optimal experience as which Csikszentmihalyi (1975) describes flow, despite the person's intrinsic motivation.

As mentioned above, someone may be intrinsically motivated to climb a difficult route without sufficient abilities. In order to compensate for the lack of abilities, this person needs problem-solving - the functional mechanism that compensates for insufficient abilities. However, a person might perceive his or her skills or abilities as sufficient and the activity might be congruent with this climber's implicit motives, but competing cognitive preferences could be activated. Alternatively, the climber might find the activity important but it might not arouse the climber's implicit motives. In either case, the incongruence between the implicit and explicit domain leads to behavioural conflict that requires volitional regulation - the functional mechanism which compensates for the lack of intrinsic motivation (Kehr, 2004b). In this sense, volitional regulation is a means of self-control to overcome motivational obstacles. Volitional regulation requires volitional

strength, which consumes resources (Muraven & Baumeister, 2000). Consequently, extensive use of volitional acts depletes volitional strength, which can have negative consequences on well-being (Kehr, 2004a) and flow experience (Rheinberg, 2002; Rheinberg & Engeser, 2010). *Figure 2* illustrates the compensatory model of motivation and volition and the relationships between the structural components.

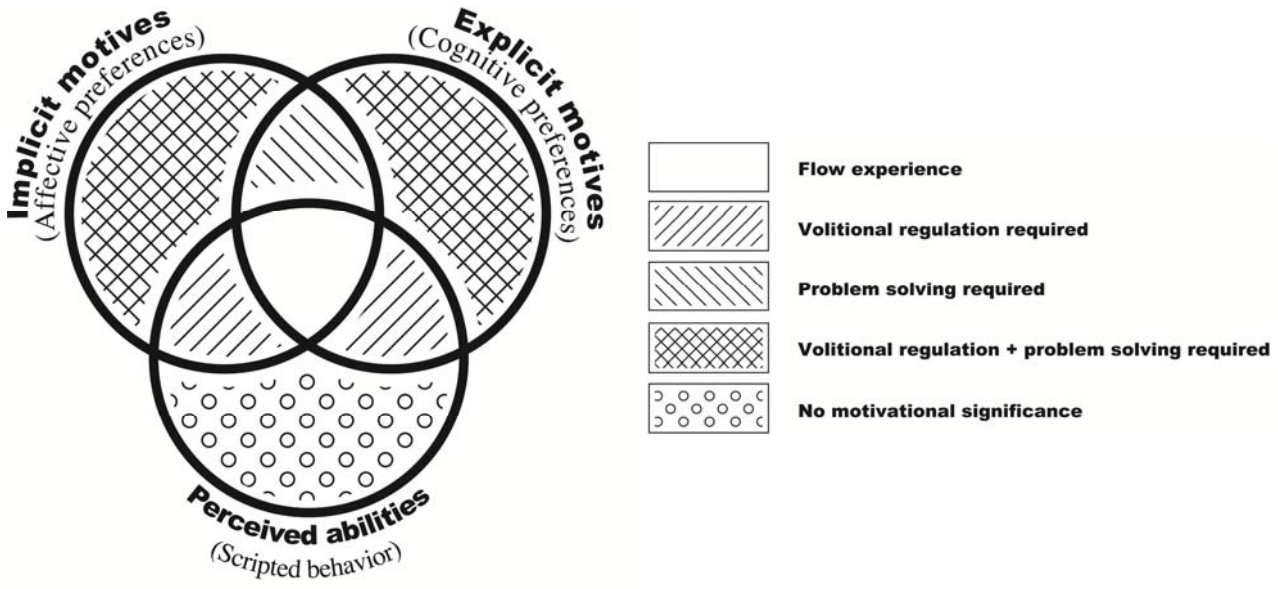

Figure 2. Schematic Overview of the Compensatory Model of Motivation and Volition. In the section where all three circles overlap, a person is motivated in an optimal way and is likely to experience flow. In the sections where just two circles overlap, a person requires one of the two functional mechanisms in order to compensate for the lack of optimal motivation. In the sections with no overlap, a person requires both functional mechanisms to compensate for a lack of optimal motivation except for the perceived abilities circle. Here, functional mechanisms do not help because the person is not motivated at all. Adapted from Kehr (2004b, p. 490).

In summary, the compensatory model of motivation and volition states that "congruence of implicit motives, explicit motives, and perceived abilities is associated with flow" (Kehr, 2004b, p. 489) – the optimal experience. Problem solving compensates for lacking perceived abilities; volitional regulation compensates for incongruent implicit and explicit motives. In either case, flow experience is unlikely to occur.

1.3. Motive Arousal and Flow Experience

Csikszentmihalyi (1975) interviewed people pursuing autotelic activities and describes their subjective experiences as optimal and labels it *flow experience*. In this context, autotelic means that people pursue these activities for the sake of the activity itself without expecting any external rewards such as money or prestige. The activity itself becomes the incentive. Typical autotelic activities Csikszentmihalyi describes are rock climbing, playing chess, dancing, but also doctor's experiences in surgery. The experiences his subjects describe while in flow are (1) intense and much focussed concentration on the task at hand, (2) merging of action and awareness, (3) loss of reflective self-consciousness, (4) sense of control of one's actions, (5) distortion of temporal experience, and (6) experience of the activity as intrinsically rewarding. In an autotelic activity, preconditions for experiencing flow are (a) clear proximal goals, (b) immediate feedback about one's progress, and (c) a balance between demands[1] of the activity and personal skills (Nakamura & Csikszentmihalyi, 2005).

In his channel model, Csikszentmihalyi (1975) conceptualises the balance between demands and skills as the main precondition for flow experience. In the reformulated quadrant model, he added that demands and skills need to be on a high level in order to experience flow (Csikszentmihalyi & Csikszentmihalyi, 1988). However, some studies find that people also experience flow in the boredom quadrant where skills are high but demands are low (i.e., Clarke & Haworth, 1994; Csikszentmihalyi & Csikszentmihalyi, 1988; Ellis, Voelkl, & Morris, 1994). In consequence, Csikszentmihalyi (1997b) renamed the "boredom quadrant" to "relaxation quadrant". Some studies support this quadrant model (i.e., Csikszentmihalyi & LeFevre, 1989; Keller & Bless, 2008; Schallberger & Pfister, 2001), while others suggest extended approaches such as including individual differences as moderators. For example, habitual action orientation (Keller &Bless, 2008), intrinsic motivation orientation (Abuhamdeh, 2008; Abuhamdeh & Csikszentmihalyi, 2009), perceived importance (Engeser & Rheinberg, 2008), the explicit (Eisenberger, Jones, Stinglhamber, Shanock, & Randall, 2005) and the implicit achievement motive (Engeser & Rheinberg, 2008; Schüler, 2007) moderate the effects of the demands-skill balance on flow experience. Furthermore, other variables than demands and skills also influence flow experience, namely the autotelic personality (Baumann & Scheffer, 2010a, 2010b) – operationalised as the intrinsic component of the achievement motive assessed with the

[1] Csikszentmihalyi (1975) uses the term "challenges" instead of "demands". However, Rheinberg (2008a) points out that a "challenge" is already the result of a demand-skill balance and that "Csikszentmihalyi's (1975) theoretical model was logically based on demands" (p. 340). Hence, we use the term "demands" because it is more precise and stringent.

OMT (Kuhl & Scheffer, 1999; Kuhl et al., 2003) – and competence need satisfaction moderated by the implicit achievement motive (Schüler, Sheldon, & Fröhlich, 2009).

These findings are compatible with the assumptions of the compensatory model of motivation and volition concerning flow experience. First, perceived abilities – as conceptualised by the demand-skill balance – do not explain flow experience sufficiently. Competence need satisfaction and the autotelic personality, for example, also predict flow experience. Second, perceived abilities interact with dispositional variables including implicit and explicit motives. Third, the finding that people experience flow not only in the flow quadrant but also in the boredom/relaxation quadrant supports Kehr's (2004b) notion that perceived abilities that are higher than the demands in the activity do not prevent flow experience as long as the affective preferences (aroused implicit motives) are congruent with the activity and no competing cognitive preferences (aroused explicit motives) are activated.

Thus far, research on flow experience has studied autotelic activities and has examined the perceived demands-skills balance and related moderators; i.e., it focuses on the person. In this sense, the situational component - as conceptualised in the classical approach to motivation – has been neglected. To our knowledge, nobody has examined the "autotelic impact" of the activity, which is the activity-related incentive strength. The activity-related incentives interact with people's motives. For example, if an activity such as wall climbing provides achievement-related incentives, someone with a high implicit achievement motive should experience more flow in this activity than someone with a low achievement motive. Likewise, someone with a high implicit achievement motive should experience more flow on a climbing route with strong achievement-related incentives than on a climbing route with weaker achievement-related incentive. Thus, our first research question is whether the arousal of the implicit achievement motive through achievement-related incentives leads to flow experience in indoor wall climbers.

1.4. Motive Congruence and Flow Experience

As explained above, the first precondition for flow experience according to the compensatory model of motivation and volition (Kehr, 2004b) is the arousal of implicit motives. The second precondition is that no competing explicit motives should be aroused at the same time. This definition applies on a proximal level, that is, in a current situation. However, when changing the focus to a more distal or dispositional level, one could argue that it is the motive congruence that is associated with flow experience. In concordance with the compensatory model of motivation and volition, Rheinberg (2002,

2008a), proposes the flow hypothesis of motive congruence. He argues that people who are aware of their implicit motives behave in a more motivationally competent manner, that is, they "do not engage unnecessarily in motive-incongruent activities" (Rheinberg & Engeser, 2010, pp. 533–534). He further explains that on a distal level, "motivational competence implies congruence between a person's implicit motives and his or her motivational self-concept", i.e., explicit motives (Rheinberg, 2008a, p. 343).

Empirical evidence for this notion was provided by Clavadetscher (2003), who examined participants in cultural projects, Rheinberg (2005), who examined scientists and administrative assistants using the experience sampling method (ESM, Csikszentmihalyi & Larson, 1987; Csikszentmihalyi & LeFevre, 1989), and Schiepe-Tiska, Schattke, Seeliger, and Kehr (2011) who examined students using an open innovation software. However, we only found one published journal article. In that article, Schüler (2010) examined people in different sports in a cross-sectional field study, a longitudinal field study, and an experimental lab study. She found that implicit/explicit achievement incongruence impairs flow experience but only if the situation contributes achievement-related incentives. This supports the idea that motive congruence leads to flow experience and highlights the importance of including activity-related incentives in the analysis of flow experience.

However, Schüler's (2010) field studies are quasi experimental because subjects were not randomly assigned to the conditions, which impedes a causal interpretation. Moreover, the lab experiment used an imagination technique instead of examining subjects in the actual situation, which impedes the ecological validity of these findings. Finally, Schüler (2010) did not assess perceived abilities or the demand-skill balance. Despite these limitations, these findings are in line with the classical approach to motivation and support the compensatory model of motivation and volition (Kehr, 2004b).

Thus, our second research question is focused on whether we can replicate Schüler's (2010) findings that perceived achievement incentive strength moderates the impact of implicit/explicit achievement motive congruence on flow experience. We aim to add validity to Schüler's (2010) results by having control over the incentive strength and by measuring flow experience in vivo that is observing indoor wall climbers directly in their current activity.

1.5. Antecedents of Motive Congruence

The theoretical considerations and the empirical evidence discussed in the section above suggest that motive congruence has a positive impact on flow experience, while motive discrepancy has a negative impact. McClelland et al. (1989) stated that "whatever the

reasons for discordance between implicit and explicit motives, it can certainly lead to trouble" (p. 700). Hence, one could expect that motive congruence does not only affect flow experience but other outcomes as well. Indeed, several studies suggest that motive congruence predicts different outcomes. For example, motive congruence has a positive impact on affect and well-being (i.e., Fischer, 2010; Kehr, 2004a; Langan-Fox, Sankey, & Canty, 2009; Langens, 2007; Schüler et al., 2008), life satisfaction (i.e., Langan-Fox, Canty, & Sankey, 2010; Schüler et al., 2008), healthy eating behaviour (i.e., Job, Oertig, Brandstätter, & Allemand, 2010), volitional strength (i.e., Kehr, 2004a), and identity development (i.e., Hofer et al., 2006). Conversely, motive discrepancy is associated with depressive symptoms (i.e., Baumann et al., 2005) and depression (i.e., Langan-Fox & Canty, 2010). Furthermore, goal-motive congruence fosters goal progress and well-being (Brunstein et al., 1998; Schultheiss, Jones, Davis, & Kley, 2008), goal commitment (Job & Brandstätter, 2009), and life satisfaction (Hofer & Chasiotis, 2003). Finally, congruence between implicit motives and social values enhances life satisfaction across different cultures (Hofer et al., 2006).

Apparently, congruence between the implicit and explicit domain has positive outcomes for motivation, performance, and health. At the same time, research consistently shows that implicit and explicit motives do not correlate or only correlate weakly with each other (i.e., Brunstein et al., 1998; Brunstein, 2008; Kehr, 2004a; McClelland, 1987; Schattke et al., 2010; Schüler, 2010; Thrash et al., 2010). Furthermore, implicit and explicit motives predict different outcomes (i.e., Brunstein & Hoyer, 2002; Brunstein, 2003; Brunstein & Maier, 2005; Koestner et al., 1991; Spangler, 1992; Woike, Gershkovich, Piorkowski, & Polo, 1999) (see Chapters *1.2.1.1* and *1.2.1.2*). Even though implicit and explicit motives appear to be uncorrelated across populations, it is still possible that a large number of people are either congruent or incongruent in their implicit and explicit motivational system (McClelland, 1987; Thrash et al., 2010). Hence, there must be some factors promoting motive congruence.

According to Rheinberg (2002, 2008a) and Kehr (2002, 2005, 2009), awareness of one's implicit motives promotes motive congruence because people who are aware of their implicit motives engage more often in situations that fit with their implicit motive structure. Rheinberg and Engeser (2010) suggest introspection and Kehr (2002, 2009) developed and validated (Kehr & von Rosenstiel, 2006) a self-management training in order to enhance motive congruence. Schultheiss and Brunstein (1999) use an imagination technique to bridge the gap between the implicit and explicit domain. Job and Brandstätter (2009) empirically validated this idea, highlighting that the imagination also needs to focus on the affective component of motive arousal in order to be effective.

Furthermore, Rawolle (2010) used motive-specific visions to bridge the gap between the implicit and explicit domain, which led to increased motivation, increased motive specific hormone release, and increased task performance. Finally, Baumann et al. (2005) demonstrated that stress in people with high state orientation reduced motive congruence. On a dispositional level, Baumann et al. (2005) emphasised state orientation while Csikszentmihalyi (1990) emphasised the autotelic personality as promoters of motive congruence. However, neither of those attempts explains how people "naturally" develop motive congruence without trainings, imagination techniques, or other interventions.

In their summary on factors that influence the relation between implicit and explicit motives, Thrash et al. (2010) concluded that self-determination is the most promising moderator of congruence between implicit and explicit motives. Thrash and Elliot (2002) conceptualise self-determination as a trait that incorporates the magnitude to which people are "attuned to the needs of the self, and use this knowledge in deciding whether to accept or reject forces that impinge on the self, such as impulses and social pressures" (p. 732). These authors demonstrate that people high in self-determination show a higher congruence between implicit and explicit achievement motives than people low in self-determination.

> *"Enhanced motive congruence was thought to result from a process wherein self-determined individuals attended to and embraced their deep-rooted affective tendencies (i.e., implicit motives) as they developed their more cognitive values (i.e., explicit motives). In contrast, those low in self-determination were presumed to internalize the values of the social environment without regard to their pre-existing implicit motives and thus fail to achieve integration"* (Schattke, et al., 2010, p. 3).

Furthermore, Thrash et al. (2007) report three additional personality factors – private body consciousness, self-monitoring, and preference for consistency – which uniquely moderate motive congruence. Thrash et al. (2010) concluded that "indeed, self-access, resistance to heteronomous influences, and personality integration - which parallel the three moderators examined by Thrash et al. (2007) - are core aspects of what it means to be self-determined (Deci & Ryan, 1985)" (p. 314). In addition, a recent study validates the moderating role of self-determination across different cultures (Hofer et al., 2010).

Thrash et al. (2007) raise the question whether parents and other socialising agents are able to foster motive congruence by enhancing self-determination. Parents could use the same processes that are successful in order to promote self-determination such as fostering self-awareness, personality integration, and the capacity to resist controlling

external influences. However, childhood environments that “thwart self awareness (e.g., by suppressing private bodily awareness), impede personality integration (e.g., by not allowing for a self-checking process between parentally endorsed values and a child’s own inclinations), and demand strict compliance to external controls” (Schattke et al., 2010, p. 3) should inhibit the development of motive congruence. In concordance with Schattke et al. (2010), we argue that the same processes that are associated with the development of self-determination should also foster the development of motive congruence because, so far, self-determination is the most promising moderator of motive congruence. Therefore, our third research question is to explore, whether the experience of self-determination in childhood is associated with implicit/explicit motive congruence later in life.

2. Present Studies

The present research presents three studies investigating our three main research questions generated in three latter chapters (Chapter 1.3, Chapter 1.4, and Chapter 1.5). Study 1 addresses whether the arousal of the implicit achievement motive through achievement-related incentives leads to flow experience. In this field experiment, we examine indoor wall climbers' flow experience using a within-subjects design. We compare their flow experience on four routes that differ in terms of achievement-related incentives. In addition, we assess the climbers' implicit achievement motive. In concordance with Kehr's (2004b) first proposition that flow experience occurs if the activity arouses one's implicit motives, our general assumption is that the interaction between achievement-related incentives and the implicit achievement motive leads to flow experience. In concordance with Kehr's (2004b) third proposition concerning flow experience that one needs to perceive one's abilities as sufficient, we adjust the routes' difficultly levels to the climbers' abilities. To date, no research has experimentally demonstrated that the achievement incentive strength in interaction with the implicit achievement motive leads to increased flow experience. Study 1 provides empirical support for the assumptions of the compensatory model of motivation and volition (Kehr, 2004b) and highlights the importance of observing motive-incentive interactions.

Study 2 addresses whether perceived achievement-related incentive strength moderates the impact of implicit/explicit achievement motive congruence on flow experience. In this cross-sectional field study, we examine indoor wall climbers' flow experience once again. As predictors, we measured climbers' achievement motive congruence and their perceived achievement-related incentives for climbing. As a dependent variable, we used flow increase between a route providing weak achievement-related incentives and a route providing strong achievement-related incentives. In concordance with Kehr's (2004b) proposition that the congruence between implicit motives, explicit motives, and perceived abilities leads to flow experience, our general assumption is that achievement motive congruence positively predicts flow increase. Furthermore, in concordance with Schüler's (2010) findings, we expect that perceived achievement-related incentive strength moderates this relationship. Again, we adjusted the routes' difficulty levels to the climbers' abilities. We aim to replicate Schüler's (2010) results. Moreover, we measured flow experience during and right after climbing. This research adds ecological validity to Schüler's (2010) findings and supports the assumptions of the compensatory model of motivation and volition (Kehr, 2004b) concerning flow experience on a distal level.

Finally, Study 3 addresses whether the experience of self-determination in childhood is associated with implicit/explicit motive congruence later in life. In this longitudinal study, we re-analysed data originally collected by Sears, Maccoby, and Levin (1957) and later followed up by McClelland and Pilon (1983). We explored the impact of mothers' self-reported child rearing patterns when the children were five years old on the children's motive congruence twenty-six years later. In concordance with Thrash and Elliot's (2002) finding that self-determination fosters motive congruence and with Thrash and colleagues' (2007, 2010) notion that parents should be able to promote motive congruence by fostering the children's experience of self-determination, our general assumption is that maternal child rearing patterns in early childhood that are related to children's self-determination lead to motive congruence later in life. To date, no studies have reported developmental promoters for congruence between implicit and explicit motives. This research strengthens the notion that self-determination fosters motive congruence and may lead to further research examining developmental antecedents of motive congruence. We have published these data recently in a special issue on implicit motives in *Motivation and Emotion* (Schattke et al., 2010). Accordingly, we describe this research only briefly in this dissertation.

3. Study 1

Does the Arousal of the Implicit Achievement Motive Lead to Flow Experience?

Study 1 investigates whether the arousal of the implicit achievement motive through achievement-related incentives leads to increased flow experience. To answer this question, we examined indoor wall climbers' flow experience while climbing four different routes. On these routes, we manipulated the strengths of achievement-related incentives. Accordingly, the design of Study 1 is a 2×4 aptitude-treatment design. The implicit achievement motive represents the aptitude, which is a quasi-experimental between-subjects factor (high vs. low). The different routes represent the treatment, which is an experimental within-subjects factor with repeated measures.

To manipulate the achievement-related incentive strength between the routes, we varied the degree of challenges each route provided. As described in Chapter *1.1.2.1*, people with a high implicit achievement motive enjoy challenging tasks on a medium level of difficulty (i.e., Pang, 2010b) – the task demands are neither too hard nor too low relative to people's abilities. Hence, we assessed the climbers' climbing abilities and adjusted the routes' task demands intra-personally; according to their abilities. Correspondingly, we allocated the routes in a way that the climbers' first route was too easy relative to their abilities. The second route was neither too easy nor too hard. This route provided an optimal challenge for each climber. The third route was too hard relative to the climbers' abilities. The fourth route was the same hard route again but incorporated the experience of having tried it before. As control variables and manipulation checks, we measured climbers' perceived task demands, their perceived abilities, and their perceived achievement-related incentive.

Thus, our first two hypotheses are manipulation checks. On the one hand, we adjusted the difficulty level of each route intra-individually in order to control for different skills and abilities in the climbing activity. On the other hand, we had to make sure that the climbers actually perceived less task demands on the easy route than on the challenging route and stronger task demands on the hard routes than on the challenging route. Therefore, Hypotheses 1_a and 1_b are as follows.

H_{1a}: Climbers perceive the challenging route (Route 2) as more demanding than the easy route (Route 1).

H_{1b}: Climbers perceive the hard routes (Route 3 and 4) as more demanding than the challenging route (Route 2).

Furthermore, we expected that adjusting the routes' task demands would lead to different perceived achievement-related incentive strengths. On the easy route (Route 1), climbers should experience weaker achievement-related incentives than on the challenging route (Route 2) because the route was too easy in relation to their abilities. On the hard routes (Route 3 and 4), climbers should also experience weaker achievement-related incentives than on the challenging route because the hard routes are too difficult. However, when participants climb the hard route for the second time, they should know the route better and therefore perceive it as more feasible. Hence, climbers should experience stronger achievement-related incentives on the repeated hard route (Route 4) than on the hard route first time (Route 3).

H_{2a}: Climbers experience stronger achievement-related incentives on the challenging route (Route 2) than on the easy route (Route 1).
H_{2b}: Climbers experience stronger achievement-related incentives on the challenging route (Route 2) than on the hard route (Route 3)
H_{2c}: Climbers experience stronger achievement-related incentives on the repeated hard route (Route 4) than on the hard route climbed for the first time (Route 3).

Hypotheses 3-5 are our main hypotheses regarding flow experience. Achievement-related incentives should arouse the implicit achievement motive. Consequently, achievement-related incentives should affect climbers with a high implicit achievement motive more than climbers with a low implicit achievement motive. Hence, we expect an interaction between the implicit achievement motive and the achievement-related incentives on the different routes: On routes with strong achievement-related incentives, climbers with a high implicit achievement motive should experience more flow than climbers with a low implicit achievement motive compared to routes with weak achievement-related incentives. We expect that the easy route (Route 1) provides less achievement-related incentives than the challenging route. Therefore, Hypothesis 3 states:

H_3: Climbers with a high implicit achievement motive should experience more flow on the challenging route (Route 2) than on the easy route (Route 1) in contrast to climbers with a low implicit achievement motive.

Furthermore, the hard route (Route 3) should provide less achievement-related incentives than the challenging route because the task demands exceed the climbers' abilities. Therefore, Hypothesis 4 states:

> *H_4: Climbers with a high implicit achievement motive should experience more flow on the challenging route (Route 2) than on the hard route (Route 3) in contrast to climbers with a low implicit achievement motive.*

Finally, doing something better is a natural incentive for someone with a high implicit achievement motive (McClelland, 1987). Therefore, climbing the hard route again (Route 4) should include more achievement-related incentives for climbers with a high versus low implicit achievement motive than climbing it for the first time (Route 3). Accordingly, Hypothesis 5 states:

> *H_5: Climbers with a high implicit achievement motive should experience more flow on the repeated hard route (Route 4) than on the hard route climbed for the first time (Route 3) in contrast to climbers with a low implicit achievement motive.*

In further analysis, we aim to explore whether we can find differential effects for the two sub-dimensions of flow experience - *fluency of performance* and *absorption by activity*. Before testing the above hypotheses in the results section we describe the methods in the next paragraph. We will first explain the climbing activity in more detail followed by a description of the sample, measures, and procedure.

3.1. Methods

In this study, we observed indoor wall climbers at the climbing wall right after the climbing activity. In order to understand this sport properly, it is important to describe the climbing activity in more detail.

3.1.1. The Climbing Activity. Sport climbing is the most common form of climbing. The fundamental idea of climbing is *free climbing*. Here, climbers use only the mere stone of a natural wall in order to reach the top of the wall. No auxiliary means are allowed in order to move forward. However, free climbers use appliances such as pitons, quickdraws, and climbing ropes to secure themselves. A more extreme form is called *free solo* where climbers do not secure themselves at all (Winter, 2005).

In recent years, sport climbing has become quite popular in Germany. More and more indoor climbing walls have become available. For example, there are at least five commercial climbing walls in the City of Munich and even more in the surroundings. Indoor wall climbing can be learned very easily, one does not need a lot of experience, and it takes only few efforts to learn it (Seiler, 2010).

3.1.1.1. Top-Rope Climbing and Lead Climbing. There are two different types of indoor wall climbing: *Top-rope climbing* and *lead climbing*. In *top-rope climbing*, the climbing rope is clipped at the top of the wall. The climbing partner, who secures the climber, pulls the climbing rope tight. The climber is completely secured on the entire route. Top-rope climbing is a perfect mode for beginners. In *lead climbing,* however, there is no fixed climbing robe at the top. The climber has to carry the climbing rope up the wall himself. Hence, the climber begins climbing without being secured but will secure himself about every 1.5 metre with a karabiner in the wall.

If the climber falls, he will only fall down to the position of the last karabiner. Then, the climbing rope will get tight and therefore stop the fall. Lead climbing counts as more demanding (Lindlacher, 2010) than top-rope climbing and most wall climbers will perceive lead climbing as more interesting, challenging, and enjoyable than top-rope climbing (Vesenbeckh, 2010).

3.1.1.2. Redpoint Climbing and Onsight Climbing. Lead climbing can be performed using two different styles: *Redpoint climbing* and *onsight climbing*. The most common style is *redpoint* (Vesenbeckh, 2010). In redpoint, a climber succeeds the wall in one way without falling or pausing on the wall and without using karabiner or any auxiliary means to pull him- or herself up (Perwitzschky, 2007). However, karabiners are allowed to secure the climber. In addition, it is allowed to explore, try, or train the route before. One may also observe other climbers or ask them for advice about the route.

If a climber succeeds an *unknown* route in redpoint, it will be called *onsight*. In onsight, it is neither allowed to know the route in advance nor to observe other climbers while on the respective route or asking them for advice. The performance difference between redpoint level and onsight level is usually one UIAA-level (Perwitzschky, 2007). The next paragraph explains the UIAA-Scale in more detail.

3.1.1.3. The UIAA-Scale. The UIAA is the *International Mountaineering and Climbing Federation* (Union Internationale des Associations d'Alpinisme (UIAA), 2007). Climbers use the UIAA-Scale to assess the difficulty of a route. The first person who climbs a specific route evaluates its difficulty by comparing it to other routes with similar character. This evaluation, however, is a suggestion rather than an exact measurement (Vesenbeckh, 2010). The evaluation is based on the technical difficulty, the amount of

step and grip combinations, structure of the wall, the steepness, and the length of the route (Kümin, Kümin, & Lietha, 1997).

The UIAA-Scale starts with *level 1* and, in theory, has no ending. Each level can be characterised with a "+" or "-" in order to indicate that the route is rather hard or easy on the respective level. For example, a route evaluated *level 7-* is not as hard as *level 7* but harder than *level 6*. A route evaluated *level 8+* is harder than the mere *level 8* but not as hard as *level 9* or *9-*. Furthermore, routes can be evaluated with in-between levels if a route's difficulty is exactly between two levels. For example, the most difficult route that was ever climbed is evaluated *level 11+/12-* (Vesenbeckh, 2010).

Worldwide, there are many different scales to assess the difficulty of climbing routes. However, those scales are comparable with each other and the UIAA-Scale is the most common one in the German-speaking countries. Therefore, we used this scale to evaluate the difficulties of the routes and the climbing abilities of the climbers (Vesenbeckh, 2010).

3.1.2. Participants. In this study, we observed $N = 31$ indoor wall climbers. Seven subjects were removed from the sample due to incomplete data sets (i.e., only climbing two routes instead of four). Six of the remaining 24 climbers were female and 18 were male. They were between 21 and 41 years old ($M = 26.21$; $SD = 3.99$). Fifteen climbers (62.5%) were students, eight (33.3%) were working, and one (4.2%) was doing an apprenticeship. Ten (41.2%) climbers indicated that their highest educational degree was a university degree, eleven (45.8%) had a high school diploma ("Abitur"), and three (12.5%) indicated they had a secondary modern school diploma ("Realschulabschluss").

Participants were recruited at three comparable Munich climbing walls. We did not find any effects for the different climbing walls. The experimenter, a certified climbing teacher, only accepted participants whose redpoint level was *level 6* or higher on the UIAA scale. This procedure was necessary to ensure that the climbers would be able to manage the three different routes, to reduce dropout, and of course for safety reasons. The participant's redpoint levels lay between 6 and 10- on the UIAA-Scale, which is an average of roughly *level 7+/8-* ($M = 7.47$; $SD = 1.01$). Their onsight levels lay between *level 5+* and *level 9-/9* on the UIAA-Scale that is an average of roughly *level 7-/7* ($M = 6.70$; $SD = 0.89$). Therefore, it seems to be justified to characterise the sample as experienced climbers.

3.1.3. Measures. The next section describes the different measures used in this study to assess the implicit achievement motive, achievement-related incentive strength, perceived task demands and abilities, and flow experience.

3.1.3.1. Implicit Achievement Motive. We assessed the implicit achievement motive with the Picture Story Exercise (PSE), a TAT-like measure using picture cues to arouse the participants' fantasy (cf. Pang, 2010a). Participants wrote imaginative stories based on the pictures they observed. These stories were later content coded for the implicit achievement motive.

The chosen pictures are supposed to be relevant to the context of interest - in this case, sport climbing (Pang, 2010a). Hence, we chose six pictures from a set of pictures (cf. Langan-Fox & Grant, 2006; Schultheiss & Brunstein, 2001; Pang & Schultheiss, 2005; Pang, 2010a; Smith, 1992) which were sport and achievement-related, namely "Bicycle race", "Boxer", "Alpinist", "Gymnast", "Snowboarder in half pipe", and "Trapeze artist". We added the "Alpinist" and the "Snowboarder" to the picture set according to the guidelines introduced by Pang (2010a). The picture selection was intended to increase the sensitivity for the achievement domain in sport situations (Pang, 2010a).

To derive the motive scores from the stories, we used Heckhausen's (1963; for an English translation see Schultheiss, 2001) scoring system, which "has gained respectability because it is to date the most systematic and comprehensive, theory-driven need achievement scoring system available" (Pang, 2010b, p. 53). A trained scorer, who achieved more than 85% concordance with calibration materials pre-scored by Heckhausen (1963), coded the stories for the two components of the implicit achievement motives: *hope of success* and *fear of failure*. In addition, another trained scorer coded 30% of these stories as well, in order to assess the concordance between these two scorers, which indicates the inter-rater reliability. The concordance between both raters was 92%[2] (95% for hope of success, 85% for fear of failure).

The average raw value was M_{HS} = 11.13 (SD_{HS} = 3.46) for hope of success and M_{FF} = 4.13 (SD_{FF} = 3.19) for fear of failure. Both variables did not differ significantly from standard distribution. On average, participants wrote M_{words} = 74.34 (SD_{words} = 29.72) words per story and M_{words} = 441.13 (SD_{words} = 145.45) words in total. Pang (2010a) suggests correcting the scores for the number of words used in the stories. However, hope of success did not correlate with the number of words (r = -.03, p = .89) but fear of failure did (r = .51, $p < .05$). Thus, we corrected the fear of failure score for the number of words using regression analysis.

In this data, hope of success and fear of failure were independent from each other (r = -.04, p = .85). For further analysis, we used the *net-achievement index* which

[2] We assessed the percentage of agreement between the two coders for each of Heckhausen's (1963) 13 scoring categories separately using the rather conservative index of concordance (2 × number of agreements between scorers / [Scorer A's scores + Scorer B's scores]; see Martin and Bateson (1993); Winter (1991)). We report the average concordance across the categories in the text.

combined the hope of success and fear of failure scores. After correcting for word length, we standardised the hope of success and fear of failure scores and calculated the difference (*z*-hope of success – *z*-fear of failure). Hence, positive scores indicate more hope of success than fear of failure whereas negative scores indicate the opposite. The net-achievement index correlated positively with hope of success (r = .69, p < .001) and negatively with fear of failure (r = -.64, p < .001). This indicates that the combined net-achievement index represents the hope *and* fear component of the implicit achievement motive well. The net-achievement index has been previously used in several other studies (i.e., Heckhausen, 1963; Puca & Schmalt, 2001; Schüler, 2007).

The reliability and validity of the PSE measure are described in very detail by McClelland (1987) and were recently reviewed by Pang (2010a, 2010b; Pang & Schultheiss, 2005; Schultheiss & Brunstein, 2001). Furthermore, "the validity of the [Heckhausen] system has been displayed in extensive studies conducted in Germany" (Pang, 2010b, p. 53). Finally, Bernecker and Job's (2010) results suggest that using an online version of the PSE yields the same validity as the paper and pencil version of the PSE.

3.1.3.2. Achievement-Related Incentive Strength. We measured the achievement-related incentive strength using the achievement scale of the *Incentive Theme Scales* constructed by Schattke, Lindlacher, Schiepe, and Kehr (2009; Lindlacher, 2010). The scale assesses how strongly a person perceives motive-related activity-incentives in a certain activity. The measure assesses achievement-, power-, and affiliation-related incentives. In this study, we only used the achievement scale because we aimed to compare the achievement-related incentive strength on the different routes.

Schattke et al. (2009; Lindlacher, 2010) constructed the items deducing them from the literature on implicit motives. As described in the introduction (see Chapter 1.1.2.1), the core of the achievement motive is to fulfil a certain standard of excellence (McClelland, Atkinson, Clark, & Lowell, 1953). Achievement-motivated people enjoy *challenging tasks* with moderate task difficulty. They strive for *perfection* and efficacy and they enjoy increasing *their performance* (Brunstein & Heckhausen, 2008; McClelland, 1987; Schultheiss, 2008). Hence, if an activity provides the opportunity for *experiencing challenges*, *striving for perfection*, and for *increasing one's performance*, it will provide strong achievement-related incentives.

Thus, we used the following three items to assess the achievement incentive strength. (1) "*While climbing this route, I could experience challenges*" (Beim Klettern dieser Route konnte ich Herausforderung erleben). (2) "*While climbing this route, I could strive for perfection* (Beim Klettern dieser Route konnte ich nach Perfektion streben)." (3)

"*While climbing this route, I could increase my performance* (Beim Klettern dieser Route konnte ich meine Leistung verbessern)." The items were answered on a 1–7 scale with 1 indicating the statement "*is not true*", 4 indicating "*partially true*" and 7 indicating "*is true*". The scale showed internal consistencies of α = .63-.68 in recent studies (Lindlacher, 2010; Schattke, Seeliger, Schiepe-Tiska, & Kehr, 2011). In this study, the internal consistencies were α = .60-.75. More importantly, a confirmatory factor analysis indicated good construct validity (Schattke et al., 2009).

3.1.3.3. Perceived Task Demands and Perceived Abilities. We assessed perceived task demands and perceived abilities with two items on a 9-point scale. The item measuring perceived task demands was "*Compared to all other activities which I partake in, this one is...*" ranging from "*easy*" (1) to "*difficult*" (9). The item measuring perceived abilities was "I think that my competence in this area is..." ranging from "*low*" (1) to "*high*" (9) (Engeser & Rheinberg, 2008; Rheinberg, Vollmeyer, & Engeser, 2003; Rheinberg, 2004). The items have been successfully used in several studies (i.e., Engeser & Rheinberg, 2008; Engeser, 2005; Schüler, 2007).

3.1.3.4. Flow Experience. We assessed flow experience using the *Flow Short Scale* (Rheinberg et al., 2003). This measure assesses all components of flow experience using ten items. Participants rated their agreement with the items on a seven-point scale ranging from 1 "*not at all*" to 7 "*very much*". The flow short scale includes items such as "*I don't notice time passing*" and "*The right thoughts/movements occur of their own accord*" (Engeser & Rheinberg, 2008). The mean value of the ten items reflects an overall score of flow experience in a certain activity. Additionally, a two-factor solution of the ten-item measure captures different aspects of flow experience (Rheinberg, 2004). The first factor is called "*fluency of performance*" and consists of six items (i.e., "*My thoughts/activities run fluidly and smoothly*"). The second factor is called "*absorption by activity*" and consists of four items (i.e., "*I am totally absorbed in what I am doing*") (Engeser & Rheinberg, 2008).

Several studies demonstrated the reliability and validity of the flow short scale (i.e., Engeser & Rheinberg, 2008; Rheinberg, Manig, Kliegl, Engeser, & Vollmeyer, 2007; Schattke et al., 2011; Schiepe-Tiska et al., 2011; Schüler, 2007; Schüler, 2010). In this study, the internal consistencies were good (*overall flow* α = .82-.93, *fluency of performance* α = .82-.91, *absorption by activity* α = .71-.87).

3.1.4. Procedure. The experimenter recruited climbers by posting advertisements at climbing walls, in social networks such as *Facebook,* or by making appointments with potential participants directly at the climbing walls. Before participating, climbers had to take part in an online pre-test. Here, climbers completed the PSE and filled in socio-

demographic information. Furthermore, they were informed about the procedure and that they would take part in a research project, that their participation was voluntary, and that they could stop their participation in the study at any time. The online pre-test took about 30 minutes.

At the climbing wall, the experimenter explained the procedure to the climbers and introduced them to the questionnaires they would fill in after having climbed a route. The experimenter asked for the climbers' redpoint and onsight performance level in order to decide which routes they should climb in the different conditions.

Each participant was observed four times but only on three different routes. The difficulties between these routes differed significantly on the UIAA-Scale ($F(2, 69) = 36.36$, $p < .001$, $r^3 = .71$). Route 1 was easy ($M = 4.96$; $SD = 1.06$), which means that the level on the UIAA-Scale was clearly below the climbers' redpoint performance level. Climbers would use such a route for warming up. Route 2 had a medium difficulty level ($M = 6.50$; $SD = 0.85$), which had significantly higher values on the UIAA-Scale than Route 1 ($t(69) = 5.80$, $p < .001$ (1-tailed), $r = .57$). Route 2 was neither too easy nor too hard but still demanding. The UIAA-level of the route was between the climbers' redpoint and onsight performance level and therefore challenging which means it should have provided the strongest achievement-related incentives. The third route was too difficult ($M = 7.18$; $SD = 0.85$), which means its UIAA-level of the route was slightly above the climbers' onsight performance level. The UIAA-level was significantly higher than the one on Route 2 ($t(69) = 2.52$, $p < .01$ (1-tailed), $r = .29$). Participants climbed this route twice.

All climbers succeeded the easy (Route 1) and the challenging route (Route 2). However, no one mastered the hard route (Route 3) on their first trial. 84% of the climbers had to stop already on the first half of the route. When climbing the hard route again (Route 4), nine climbers (37.5%) mastered the route. Two climbers failed on the second half of the repeated hard route and the remaining thirteen (54.2%) failed in the first half.

In each session, the experimenter observed two climbers. One was climbing while the other one would belay the climber and rest at the same time. The experimenter observed the climbers and filled in a protocol list. Immediately after a climber finished a route and was back on the ground, the experimenter administered the questionnaires. After that, the other participant climbed his or her next route.

One session took at least two hours but the time varied tremendously. It took a lot of effort for the climbers in terms of time and power. However, they would have invested

[3] In this dissertation, we report all effect sizes as Pearson's correlation coefficient r as suggested by Field (2009). Values lie always between 0 and 1 and can be compared between all analyses. According to Cohen (1988, 1992), values with $r = .10$ represent a small effect, values with $r = .30$ represent a medium effect, and values with $r = .50$ represent a large effect.

a comparable amount of time and would have climbed a comparable number of routes, even if they had now been observed for this study. Hence, the observation can be qualified as ecologically valid. See Vesenbeckh (2010) for further descriptions of the setting and procedure that was used.

3.2. Results of Study 1

The aim of this Study 1 was to experimentally demonstrate that the arousal of the implicit achievement motive leads to flow experience. The implicit achievement motive should be aroused by achievement-related activity-incentives. We first present the descriptive statistics of all measures. Second, we present the test statistics for our manipulation checks and hypotheses. Third, we present further analyses concerning the different aspects of flow experience.

3.2.1. Descriptive Statistics. Table 1 shows the psychometric properties of the major variables included in Study 1. It shows that the means for task demands were different between the four routes. On the easy route, climbers perceived the lowest task demands and the highest on the hard routes (Route 3 and 4). On the other hand, the mean values for perceived abilities were quite similar on the different routes. The mean values for perceived achievement-related incentives, however, increased from Route 1 to Route 4. Finally, the mean values for flow experience differed across the four routes. However, these differences seemed to be smaller than in the other variables. The challenging route had the highest flow value and the hard route had the lowest. On both hard routes, the standard deviations were higher than on the easy and challenging route. Furthermore, all flow values were above the potential scale means of "4". When transferring the flow means into *t*-values[4], it shows that climbers experienced flow in a "normal" range in comparison to other activities. The mean *t*-values ranged from the mean (M = 50) and nearly one standard deviation (SD = 10) above the mean of the *T*-distribution (T_1 = 54.63, T_2 = 57.17, T_3 = 50.50, T_4 = 53.54). Both findings suggest that the climbers experienced a meaningful amount of flow on all routes.

Table 2 presents the bivariate correlations between all measures. Most flow measures correlated positively with one another (rs = .49-.64, ps < .05) except for flow experience on Route 1 with flow experience on Route 3 and 4. Task demands on Route 3 and 4 correlated with each other (r = .48, p < .05), which is not surprising since these were the same routes. The perceived abilities on all four routes correlated positively with each other (rs = .44-.75, ps < .05). These findings speak to the validity of the measurement.

[4] *T*-Values for comparison were retrieved from Rheinberg (2004).

Table 1

Psychometric Properties of all Major Variables in Study 1

Variable	*M*	*SD*	α	Range	
				Potential	Actual
Implicit Achievement Motive					
Net-Achievement Index	-0.02	1.45	-	-	-2.07-2.72
Task Demands					
Route 1 - Easy Route	2.50	0.98	-	1-9	1-5
Route 2 - Challenging Route	5.67	1.40	-	1-9	3-8
Route 3 - Hard Route	7.71	1.16	-	1-9	5-9
Route 4 - Hard Route Again	7.83	0.92	-	1-9	6-9
Perceived Abilities					
Route 1 - Easy Route	5.67	1.44	-	1-9	3-9
Route 2 - Challenging Route	5.42	1.28	-	1-9	3-8
Route 3 - Hard Route	5.29	1.49	-	1-9	3-8
Route 4 - Hard Route Again	5.54	1.38	-	1-9	3-8
Perceived Achievement Incentives					
Route 1 - Easy Route	2.88	1.50	.78	1-7	1.00-6.67
Route 2 - Challenging Route	5.11	0.85	.61	1-7	3.33-7.00
Route 3 - Hard Route	5.54	1.03	.52	1-7	3.00-7.00
Route 4 - Hard Route Again	5.67	1.15	.70	1-7	3.00-7.00
Flow Experience					
Route 1 - Easy Route	5.44	0.85	.85	1-7	2.90-7.00
Route 2 - Challenging Route	5.70	0.89	.91	1-7	4.00-6.70
Route 3 - Hard Route	4.95	1.10	.92	1-7	1.90-6.60
Route 4 - Hard Route Again	5.24	1.21	.93	1-7	2.50-7.00

Note. $N = 24$. Table 1 shows the means, standard deviations, the cronbach's alphas, and the ranges of the scales used in Study 1. For task demands, perceived abilities, perceived achievement-related incentives, and flow experience, the values are presented for the four different routes.

Table 2

Correlations of all Major Variables in Study 1

Variable	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
1. Net-Achievement Index	-.02	.07	-.22	-.18	-.03	.06	.09	.01	-.08	-.00	-.04	.13	.01	.33	.16	**.50**
2. Task Demands Route 1	-	.12	-.05	-.04	.15	.10	.31	.14	.15	.00	.33	.21	-.08	.11	.13	.18
3. Task Demands Route 2		-	.31	.36	.18	.32	.19	.25	-.19	.19	.21	.08	-.22	.02	.12	.23
4. Task Demands Route 3			-	**.48**	-.08	-.03	-.12	.21	-.05	-.05	-.20	.03	-.36	-.20	**-.57**	-.20
5. Task Demands Route 4				-	.05	.13	.00	.21	.05	.04	.19	.35	.07	-.01	.04	.20
6. Abilities Route 1					-	**.57**	**.63**	**.44**	-.11	.17	-.07	.14	-.22	-.19	.17	.08
7. Abilities Route 2						-	**.50**	**.75**	.09	.04	-.21	-.14	-.08	.27	.17	.27
8. Abilities Route 3							-	**.68**	-.35	-.09	.22	.38	-.21	.04	**.47**	**.43**
9. Abilities Route 4								-	-.04	-.15	-.11	.09	-.10	.14	.07	.23
10. Incentives Route 1									-	.34	.01	-.19	.29	.19	-.07	-.23
11. Incentives Route 2										-	**.48**	.24	-.15	-.15	.04	-.12
12. Incentives Route 3											-	**.57**	.08	.08	**.51**	.24
13. Incentives Route 4												-	-.06	-.07	.25	**.42**
14. Flow Route 1													-	**.62**	.29	.15
15. Flow Route 2														-	**.49**	**.56**
16. Flow Route 3															-	**.64**
17. Flow Route 4																-

Note. $N = 24$. Bold values indicate significant correlations. $rs > .41$. $p < .05$, $rs > .55$, $p < .01$ (two-tailed).

"Task Demands" and "Abilities" are subjective ratings by the climbers. "Incentives" refers to perceived achievement-related incentives.

On Route 3, task demands correlated negatively with flow experience (r = -.57, p < .01) whereas abilities (r = .47, p < .05) and achievement-related incentives (r = .51, p < .05) correlated positively with flow experience. In other words, the less task demands and the more abilities and achievement-related incentives climbers perceived on Route 3, the more they experienced flow. On Route 4, achievement-related incentives (r = .42, p < .05) and the implicit achievement motive (r = .50, p < .05) correlated positively with flow experience. The next paragraph presents the inference statistics for manipulation checks, hypotheses, and further analyses.

3.2.2. Manipulation Checks. Before testing our main hypotheses concerning flow experience, we checked whether climbers perceived the four routes regarding task demands, perceived abilities, and perceived achievement-related incentives in the way we expected them to. We assumed that the climbers would perceive the challenging route (Route 2) as more demanding than the easy route (Route 1) and the hard routes (Route 3 and 4) as more demanding than the challenging route (Route 2).

To test these hypotheses, we calculated a one-way Analysis of Variance (ANOVA) with repeated measures. Task demands were the dependent variable and the different routes were the independent variable. We found significant differences in task demands between the routes (F(3, 69) = 146.02, p < .001, r = .92). Contrasts revealed that climbers perceived more task demands on the challenging route (Route 2) than on the easy route (Route 1) (F(1, 23) = 93.29, p < .001, r = .89) and higher task demands on the hard routes (Route 3 and 4) than on the challenging route (Route 2) (F(1, 23) = 58.91, p < .001, r = .85). This means that climbers perceived the easy route (Route 1) as the least demanding route, the challenging route (Route 2) as more demanding and the hard routes (Route 3 and 4) as the most demanding ones. This pattern is the same as the one for the objective difficult levels on the UIAA-Scale. These results support Hypotheses 1a-b. *Figure 3* illustrates the findings.

As demonstrated above, the climbers perceived different task demands on the different routes. At the same time, this should not affect their perception of one's own abilities. Even on a difficult route, these experienced climbers should perceive themselves as skilled for climbing the routes. However, the latter assumption is a null hypothesis. Since "everyone knows that failure to reject the Fisherian null hypothesis does not warrant the conclusion that it is true" (Cohen, 1990, p. 1307), we did not state this assumption as an extra hypothesis. Nevertheless, we ran an ANOVA with repeated measures on the perceived abilities in order to provide better inside in the climbers' experiences and perceptions of the climbing activity. In this ANOVA, Mauchly's test indicated that the assumption of sphericity had been violated (χ^2(5) = 11.84, p < .05).

Hence, we corrected the degrees of freedom using Greenhouse-Geisser estimates of sphericity (ε = .81) (Field, 2009). We did not find any differences for the perceived abilities on the different routes ($F(2.42, 55.59) = 0.79$, $p = .48$, $r = .17$). These findings suggest that the climbers were aware of the different task demands on the different routes but remained confident in the perception of their abilities.

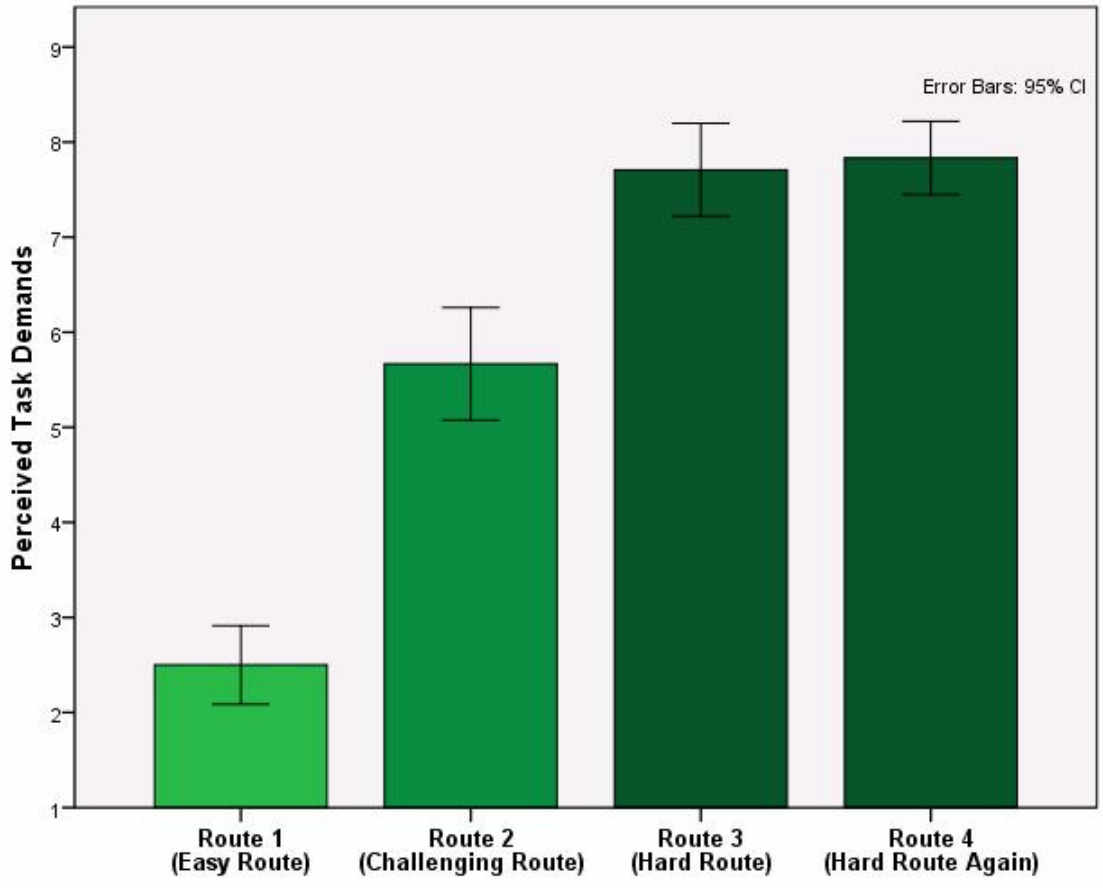

Figure 3. Perceived Task Demands on the Four Routes. Climbers perceived the lowest task demands on the easy route and the highest on the two hard routes.

In Hypotheses 2a-c, we expected the climbers to perceive achievement-related incentives differently on the different routes. More precisely, we assumed that climbers would experience stronger achievement-related incentives on the challenging route (Route 2) than on the easy route (Route 1) as well as on the hard route (Route 3). Additionally, we expected climbers to perceive stronger achievement-related incentives on the repeated hard route (Route 4) than on the hard route first time (Route 3).

Again, we conducted a one-way ANOVA with repeated measures to test our hypotheses. Mauchly's test indicated that the assumption of sphericity had been violated ($\chi^2(5) = 22.51$, $p < .001$). Therefore, we corrected the degrees of freedom using

Greenhouse-Geisser estimates of sphericity (ε = .59) (Field, 2009). The perceived achievement-related incentives differed across the four routes ($F(1.77, 40.70) = 37.28$, $p < .001$, $r = .79$). Repeated contrast revealed, as expected, that climbers perceived stronger achievement-related incentives on the challenging route (Route 2) than on the easy route (Route 1) ($F(1, 23) = 57.38$, $p < .001$, $r = .84$). This confirms Hypothesis 2a. Unexpectedly, climbers also perceived stronger achievement-related incentives on the hard route (Route 3) than on the challenging route (Route 2) ($F(1, 23) = 52.26$, $p < .001$, $r = .83$). Therefore, Hypothesis 2b was rejected. Finally, we did not find any significant difference between the hard route (Route 3) and the repeated hard route (Route 4) ($F(1, 23) = .37$, $p = .55$, $r = .14$). Hence, Hypothesis 2c was rejected as well. *Figure 4* illustrates these finding.

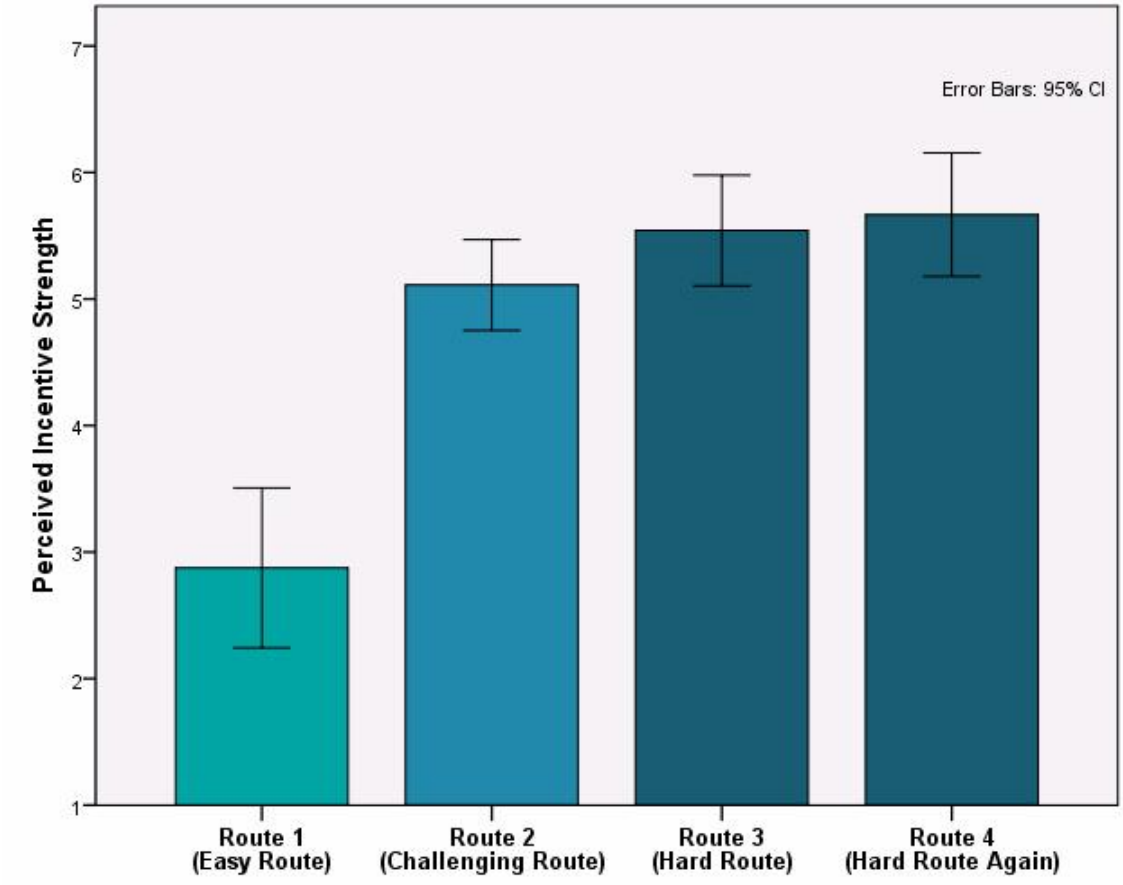

Figure 4. Perceived Achievement-related Incentives in the Climbing Activity. Climbers perceive weak achievement-related incentives on the easy route but stronger ones on the challenging and the hard routes.

3.2.3. Main Hypotheses. In Hypotheses 3-5 we tested the interaction of the different routes with the implicit achievement motive on flow experience. We expected interactions between climbers with a high versus low implicit achievement motive

between the easy (Route 1) and the challenging route (Route 2) (Hypothesis 3), between the challenging (Route 2) and the hard route (Route 3) (Hypothesis 4), and between the hard route (Route 3) and the repeated hard route (Route 4) (Hypothesis 5).

We conducted a 2×4 mixed ANOVA. Mauchly's test indicated that the assumption of sphericity had been violated ($\chi^2(5) = 11.78$, $p < .05$). Therefore, we corrected the degrees of freedom using Greenhouse-Geisser estimates of sphericity ($\varepsilon = .75$) (Field, 2009). We found a significant main effect for the implicit achievement motive ($F(1, 22) = 6.25$, $p < .05$, $r = .47$). In general, climbers with a high implicit achievement motive experienced more flow than climbers with a low implicit achievement motive. In addition, we found a significant main effect for the routes indicating differences in flow experience on the different routes ($F(2.25, 49.42) = 5.17$, $p < .01$, $r = .44$). Since we did not formulate any hypotheses concerning this main effect, we calculated post hoc analyses to compare the means. Multiple comparison analyses (Bonferroni adjusted) revealed that climbers experience more flow on the challenging (Route 2) than on the hard route (Route 3) ($p < .05$). We neither found differences between the easy (Route 1) and the challenging route (Route 2) ($p = .61$) nor between the hard route (Route 3) and the repeated hard route (Route 4) ($p = .99$).

More importantly, we found a significant interaction effect for the different routes with the implicit achievement motive ($F(2.25, 49.42) = 5.29$, $p < .01$, $r = .44$). Repeated contrasts revealed a significant interaction with the implicit achievement motive between the easy route (Route 1) and the challenging route (Route 2) ($F(1, 22) = 10.65$, $p < .01$, $r = .57$). Climbers with a high implicit achievement motive experienced significantly more flow on the challenging route (Route 2) than climbers with a low implicit achievement motive. This difference did not occur on the easy route (Route 1), which confirms Hypothesis 3.

However, we did not find a significant interaction contrast with the implicit achievement motive between the challenging route (Route 2) and the hard route (Route 3) ($F(1, 22) = 2.76$, $p = .11$, $r = .33$). On both, the challenging and the hard route, climbers with a high implicit achievement motive experienced more flow than climbers with a low implicit achievement motive. Hence, Hypothesis 4 was rejected.

Finally, we found a significant interaction contrast between the hard route (Route 3) and the repeated hard route (Route 4) ($F(1, 22) = 4.97$, $p < .05$, $r = .42$). Climbers with a high implicit achievement motive experienced more flow than climbers with a low implicit achievement motive on the repeated hard route (Route 4) but not on the hard route first time (Route 3). We found the same interaction patterns when controlling for perceived

abilities ($F(3, 66) = 3.63$, $p < .05$, $r = .37$)[5]. This result confirms Hypothesis 5. *Figure 5* illustrates these findings.

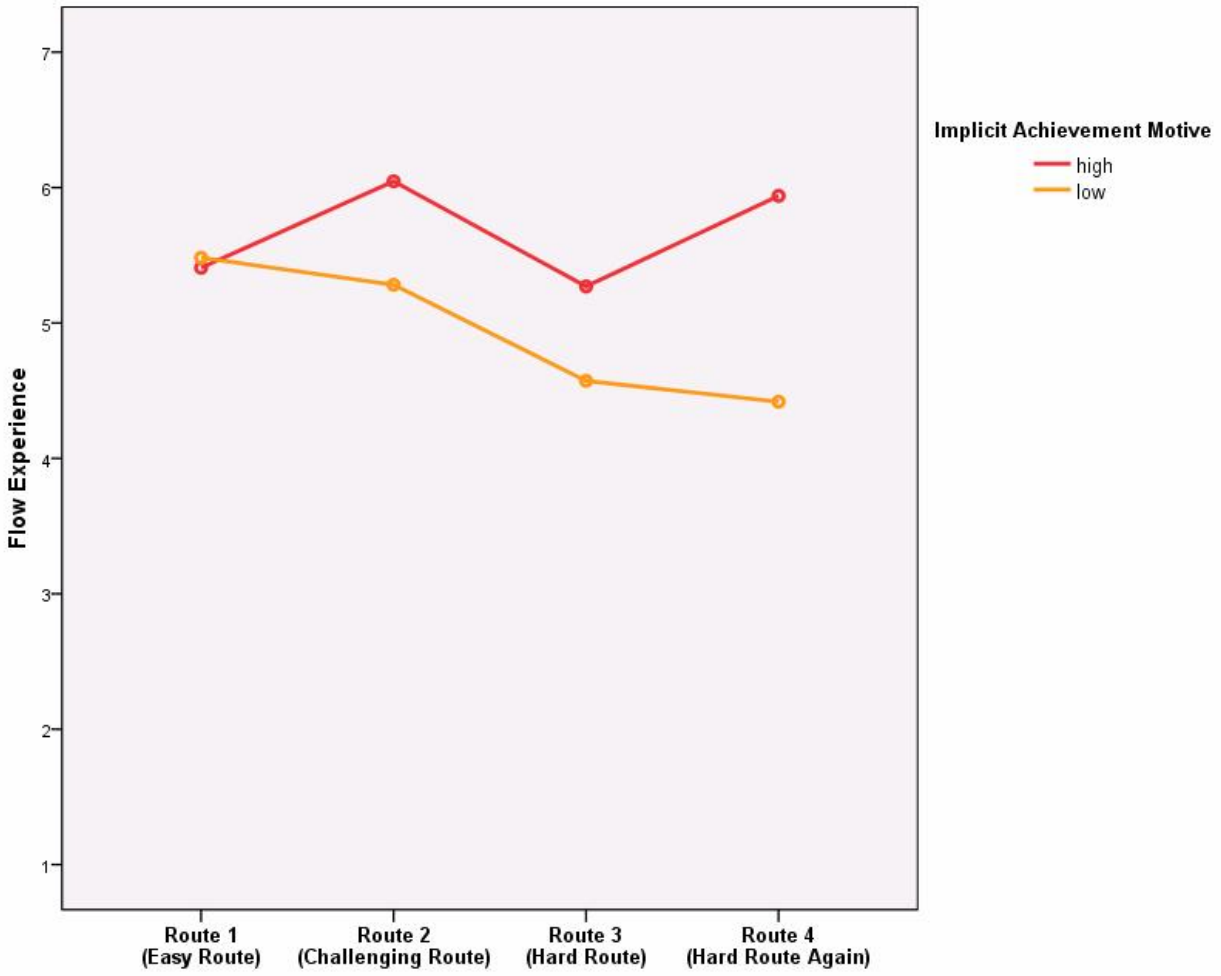

Figure 5. Flow Experience During the Wall Climbing Activity. Climbers with a high implicit achievement motive experience more flow than climbers with a low implicit achievement motive particularly on Route 2 and Route 4.

3.2.4. Further Analyses. So far, the analyses focussed on the global construct of flow experience. The following paragraph focuses on the two sub-dimensions of flow experience (Engeser & Rheinberg, 2008): *Absorption by activity* and *fluency of performance*. We explore whether the patterns of *absorption by activity* and *fluency of performance* differ from the results of the overall flow scale.

[5] When controlling for perceived abilities, we found significant interactions with the implicit achievement motive between the easy and challenging route ($F(1, 22) = 5.15$, $p < .05$, $r = .44$) and between the hard route and the repeated hard route ($F(1, 22) = 5.07$, $p < .05$, $r = .43$) but not between the challenging and the hard route ($F(1, 22) = 0.48$, $p = .49$, $r = .15$).

3.2.4.1. Fluency of Performance. We conducted a 2×4 mixed ANOVA. Mauchly's test indicated that the assumption of sphericity had been violated ($\chi^2(5) = 15.88$, $p < .01$). Hence, we corrected the degrees of freedom using Greenhouse-Geisser estimates of sphericity ($\varepsilon = .68$) (Field, 2009). We found a significant main effect for the implicit achievement motive on fluency of performance ($F(1, 22) = 8.70$, $p < .01$, $r = .53$). Climbers with a high implicit achievement motive experienced more fluency of performance than climbers with a low implicit achievement motive. We also found a significant main effect for the routes ($F(2.05, 44.98) = 18.48$, $p < .001$, $r = .69$). Multiple comparison analyses (Bonferroni adjusted) revealed that climbers experienced more fluency of performance on the challenging (Route 2) than on the hard route (Route 3) ($p < .05$). We neither found differences between the easy (Route 1) and the challenging route (Route 2) ($p = .14$) nor between the hard route (Route 3) and the repeated hard route (Route 4) ($p = .25$).

More importantly, we found an interaction between the implicit achievement motive with the different routes ($F(2.05, 44.98) = 4.46$, $p < .05$, $r = .41$). Repeated contrasts[6] revealed a significant interaction with the implicit achievement motive between the easy (Route 1) and challenging route (Route 2) ($F(1, 22) = 8.79$, $p < .017$, $r = .54$). Climbers with a low implicit achievement motive experienced less fluency of performance on the challenging route (Route 2) than on the easy route (Route 1) but there was no difference between those routes for climbers with a high implicit achievement motive. There was no significant interaction with the implicit achievement motive between the challenging (Route 2) and the hard route (Route 3) ($F_{(1, 22)} = 0.01$, $p = .93$, $r = .01$). On both routes, climbers with a high implicit achievement motive experienced more fluency of performance than climbers with a low implicit achievement motive. However, the interaction with the implicit achievement motive between the hard route (Route 3) and the repeated hard route (Route 4) failed to reach the Bonferroni adjusted significance level of $p < .017$ ($F(1, 22) = 4.36$, $p = .05$, $r = .41$). Climbers with a high and low implicit achievement motive did not differ in their fluency of performance on the hard route (Route 3). When climbing the hard route again (Route 4) however, climbers with a high implicit achievement motive seem to experience more fluency of performance than climbers with a low implicit achievement motive. *Figure 6* illustrates the findings for fluency of performance.

[6] Since post hoc analyses (i.e., multiple comparisons) are not available for interactions between a within-subjects factor and a between subjects factor (Field, 2009), we used Bonferroni adjusted contrasts instead. The resulting critical p-value was $p < .017$.

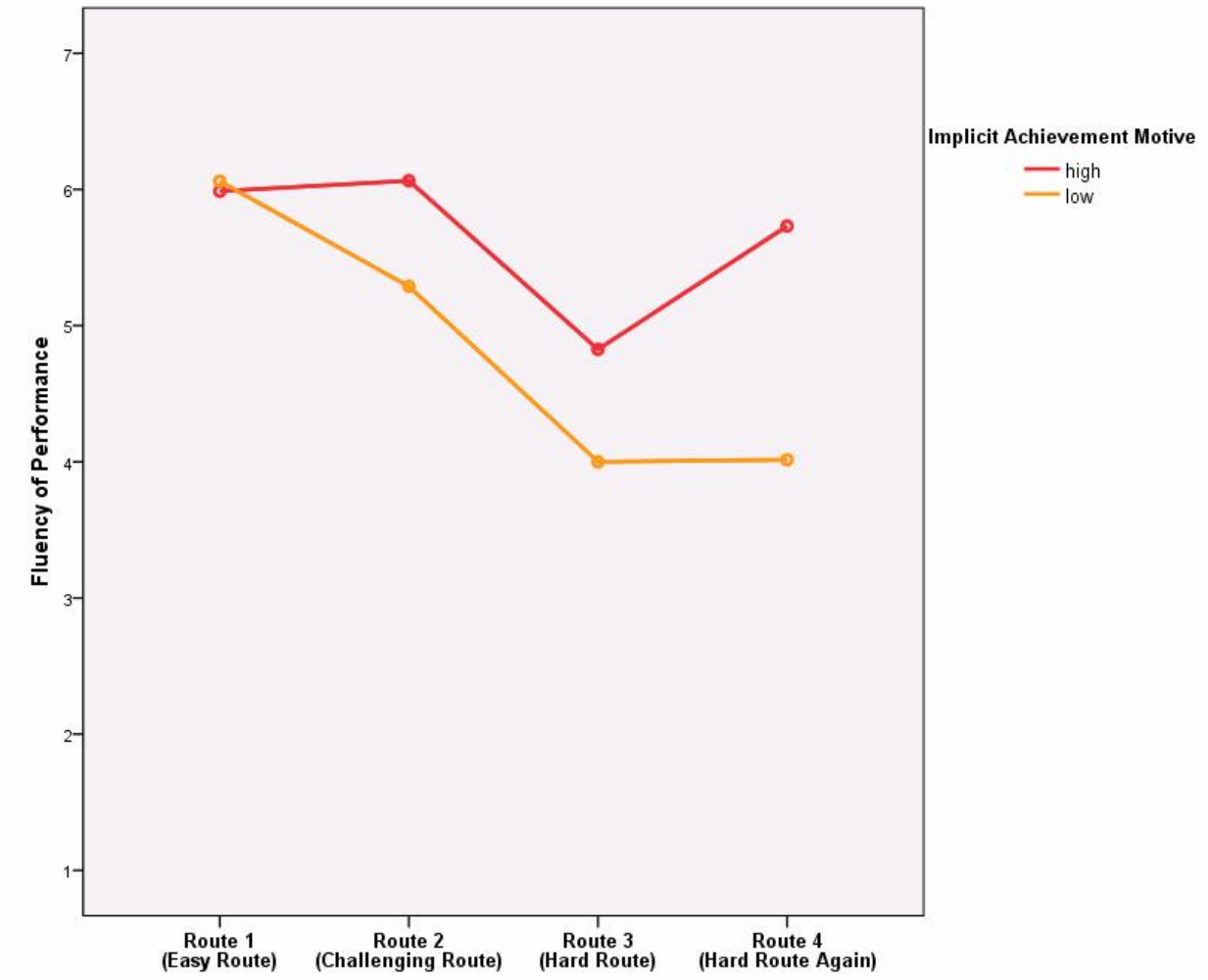

Figure 6. Fluency of Performance During the Wall Climbing Activity. Climbers with a high implicit achievement motive experience more fluency of performance than climbers with a low implicit achievement motive particularly on Route 2 and Route 4.

3.2.4.2. Absorption by Activity. Again, we conducted a 2×4 mixed ANOVA. We did not find a significant main effect for the implicit achievement motive on absorption by activity ($F(1, 22) = 2.65$, $p = .12$, $r = .33$) but for the different route ($F(3, 66) = 12.42$, $p < .001$, $r = .60$). Multiple comparison analyses (Bonferroni adjusted) revealed that climbers perceived more absorption by activity on the challenging route (Route 2) than on the easy route (Rote 1) ($p < .001$). However, we neither found a significant difference between the challenging (Route 2) and the hard route (Route 3) ($p = .99$) nor between the hard route (Route 3) and the repeated hard route (Route 4) ($p = .99$).

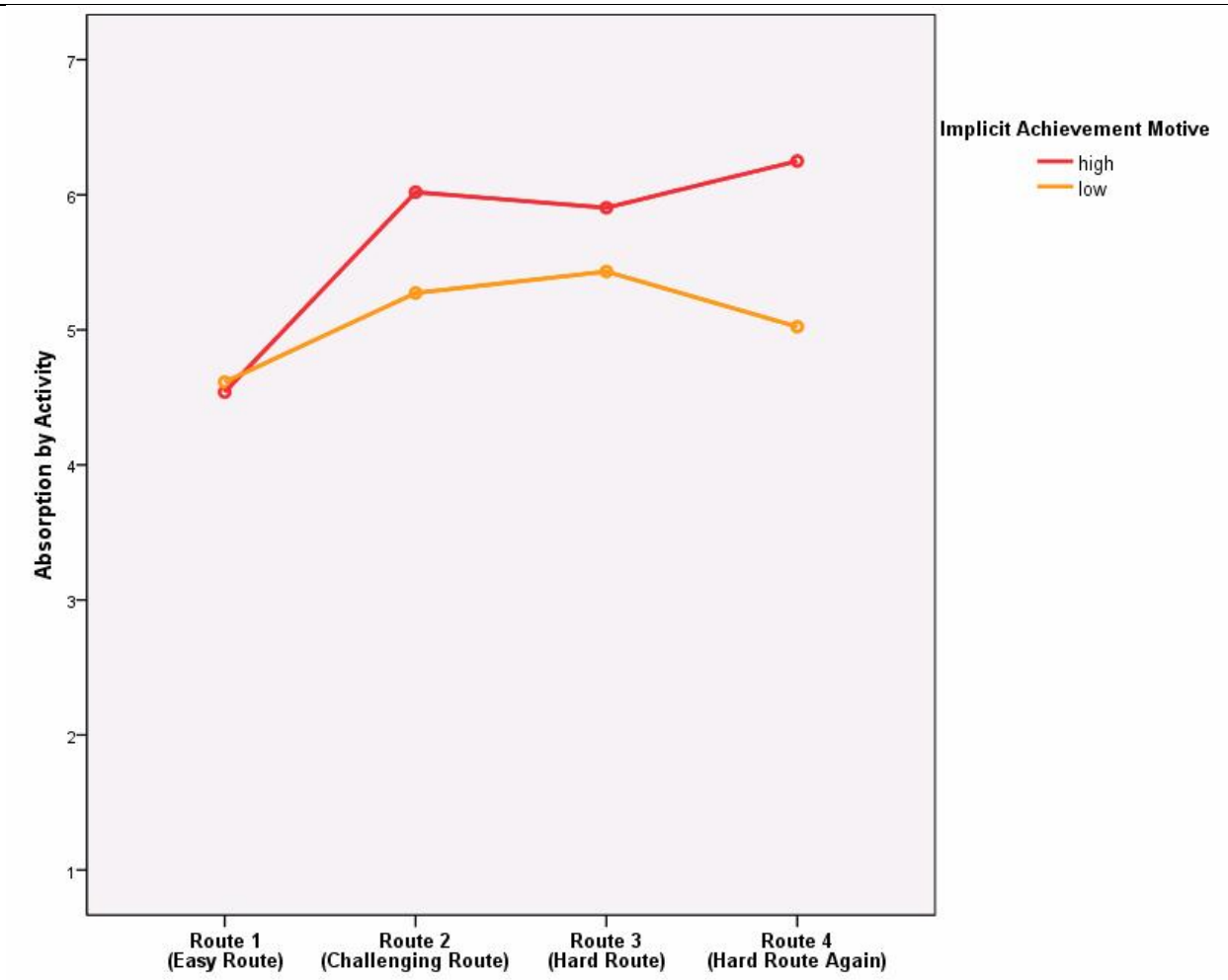

Figure 7. Absorption by Activity During the Wall Climbing Activity. Climbers with a high implicit achievement motive experience more absorption by activity than climbers with a low implicit achievement motive on Route 2 and Route 4.

More importantly, we found a significant interaction between the implicit achievement motive and the different routes ($F(3, 66) = 3.18$, $p < .05$, $r = .36$). Repeated contrasts[7] revealed that interaction with the implicit achievement motive between the easy (Route 1) and challenging route (Route 2) failed to reach the Bonferroni adjusted significance level of $p < .017$ ($F(1, 22) = 3.91$, $p = .06$, $r = .39$). Climbers with a high implicit achievement motive appeared to perceive only on the challenging route (Route 2) more absorption by activity than climbers with a low implicit achievement motive. There was no significant interaction with the implicit achievement motive between the challenging (Route 2) and hard route (Route 3) ($F(1, 22) = 0.57$, $p = .46$, $r = .17$). The interaction with the implicit achievement motive between the hard route (Route 3) and the

[7] Since post hoc analyses (i.e., multiple comparisons) are not available for interactions between a within-subjects factor and a between subjects factor (Field, 2009), we used Bonferroni adjusted contrasts instead. The resulting critical *p*-value was $p < .017$.

repeated hard route (Route 4) failed to reach the Bonferroni adjusted significance level of $p < .017$ ($F(1, 22) = 4.31$, $p = .05$, $r = .40$). Climbers with a high implicit achievement motive appeared to perceive more absorption by activity than climbers with a low implicit achievement motive, but only on the repeated hard route (Route 4). *Figure 7* illustrates the findings for absorption by activity.

3.3. Discussion of Study 1

The main research question of Study 1 was whether the arousal of the implicit achievement motive through task incentives leads to increased flow experience. We observed indoor wall climbers on different routes: (1) an intra-personally easy, (2) an intra-personally challenging route, (3) an intra-personally hard route, and (4) the same hard route again.

The manipulation checks that climbers perceived the lowest task demands on the easy route (Route 1) and the highest on the hard routes (Route 3 and 4), indicate that the difficult level was chosen accurately. As expected, climbers perceived more achievement-related incentives on the challenging route (Route 2) than on the easy route (Route 1). Contrary to our expectations, climbers experienced even more achievement-related incentives on the hard routes (Route 3 and 4), than on the challenging route (Route 2). We had expected them to experience less achievement-related incentives on the hard routes because those were too difficult in relation to their abilities. Furthermore, none of the climbers succeeded the hard route when climbing it the first time.

As expected, however, we found that climbers with a high and a low implicit achievement motive differed in their flow experience on the challenging route (Route 2) but not on the easy route (Route 1). Since the challenging route provided significantly more achievement-related incentives than the easy route, we conclude that those incentives in combination with the implicit achievement motive were responsible for the flow increase between these two routes. This supports our main assumption that the arousal of the implicit achievement motive via achievement-related incentives increases flow experience.

However, we also found that flow experience decreased unaffected by the implicit achievement motive between the challenging (Route 2) and the hard route (Route 3). This is interesting because one cannot explain this decrease in flow experience with achievement-related incentives. Unexpectedly, achievement-related incentives went up from the challenging to the hard route even though the task demands were intra-personally too high. Apparently, a route that is too difficult, affects climbers with a high versus low implicit achievement motive equally. This supports the third proposition of the

compensatory model of motivation and volition (Kehr, 2004b) regarding flow experience that an activity that is too difficult undermines flow experience but not an activity which is too easy as long as the implicit motives are aroused.

Furthermore, flow experience increased again from the hard route (Route 3) to the hard route when climbed again (Route 4) but only for climbers with a high implicit achievement motive. On the one hand, this cannot be explained by the achievement-related incentives we measured since they did not differ between these routes. On the other hand, doing something better is a natural incentive for someone with a high implicit achievement motive (McClelland, 1987) which characterises exactly the situation: trying the hard route for the first time, failing, and then trying it again. Hence, we either did not manage to measure these task-inherent achievement-related incentives correctly or the climbers did actually not *perceive* them. Either way, we believe that this interaction is caused by stronger achievement-related incentives when climbing the hard route again.

In this regard, it is important to keep in mind that all climbers failed the hard route when climbing it for the first time. This can be interpreted as negative feedback. Brunstein and Maier (2005) demonstrated that negative task inherent feedback arouses the implicit achievement motive which also explains why flow experience of climbers with a high implicit achievement motive increased. However, we cannot rule out, that failing the route affected the measurement of flow experience since climbers filled in the flow short scale after they returned to the ground. However, when climbing the hard route again, only nine out of twenty-four climbers succeeded. At the same time, eight out of the nine successful climbers had a high implicit achievement motive. Therefore, it is also possible that climbers where more successful *because* they had a high implicit achievement motive. This relationship may be mediated by the amount of flow experience. Maybe climbers are able to use self-regulatory processes to increase their flow experience which, in turn, leads to more success in climbing. In addition, we used the net-achievement index as an indicator for the implicit achievement motive. Since this is *hope of success* minus *fear of failure*, it might be the ability to focus on success and to down-regulate fear of failure, which fosters flow experience in climbing.

With regard to the latter findings, it is particularly interesting to compare the sub dimensions of flow experience: *Fluency of performance* and *absorption by activity*. When comparing how both components changed between the easy and the challenging route, one can see that *fluency of performance* decreased but only for climbers with a low implicit achievement motive. At the same time, *absorption by activity* increased from the easy to the challenging route but this increase was stronger for climbers with a high implicit achievement motive than for climbers with a low implicit achievement motive.

From the challenging to the hard route, *fluency of performance* decreased whereas *absorption by activity* did not change. Interestingly, we found similar interactions with the implicit achievement motive between the hard route and the repeated hard route for both sub dimensions: *Fluency of performance* increased for climbers with a high implicit achievement motive but did not change for climbers with a low implicit achievement. *Absorption by activity* increased slightly for climbers with a high implicit achievement motive but decreased for climbers with a low implicit achievement motive. When comparing the whole patterns of both sub dimensions, a too difficult task seems to impair particularly the fluency component for climbers with a low implicit achievement motive. Climbers with a high implicit achievement motive recover when climbing the hard route again. A too easy task seems to impair particularly the absorption component for climbers with a high implicit achievement motive.

In a nutshell, this research provides experimental evidence for the first and third proposition of the compensatory model of motivation and volition (Kehr, 2004b) regarding flow experience: people will experience flow if the activity arouses implicit motives and the abilities are perceived as sufficient. To our knowledge, this has not been demonstrated experimentally in the field yet.

However, this study has some limitations. First of all, the number of subjects was rather small. Unfortunately, it was very time consuming and effortful to recruit a lot of climbers given the facts that they also had to fill in an online questionnaire in their leisure time, the experimenter had to observe them at the wall for a relatively long time, and there had be two climbers at the same time. However, despite the small sample size we found significant effects with medium to large effect sizes indicating that we discovered meaningful results.

Moreover, we did not change the order of the routes. Therefore, we cannot eliminate order effects. For design reasons, it would have been preferable to interchange the order in which the participants had climbed the routes. However, climbers need to warm up on an easy route and cannot start immediately with a challenging or hard route because this would raise the risk of injuries which would be unethical. Furthermore, the order in which participants climbed the routes was the natural order in which climbers would perform their sport anyway. Indeed, this study is ecologically valid but cannot rule the order effects out.

Finally, this study looked exclusively at implicit motives. It would have been preferable to not only look at the implicit motive but also at the congruence between the implicit and explicit achievement motives. However, even if we had the data, the small sample size would make it hard to run a model with two between-subjects factors.

Therefore, further research should look at effects for congruence between implicit and explicit motives.

Taken together, this study demonstrates that the congruence of implicit motives with situational incentives leads to flow experience. This is in line with the classical approach to motivation and the compensational model of motivation and volition. Further research should add explicit motives to the analyses.

4. Study 2
Does Motive Congruence Lead to Flow Experience?

Study 2 examines whether implicit/explicit achievement motive congruence is associated with flow experience and whether achievement-related incentive strength moderates this relationship. To answer this question, we examined indoor wall climbers' flow experience while climbing two different routes. Analogous to Study 1, the first route was easy whereas the second route was neither too easy nor too hard but still demanding. So we concluded it provided an optimal challenge. As Study 1 demonstrated, the easy route yields less achievement-related incentives than the challenging route. Furthermore, an increase in flow experience from the easy to the challenging route could be explained by the increase of achievement-related incentives. Therefore, the dependent variable we used was flow experience on the challenging route controlling for flow experience on the easy route. This measure represents the proportion of flow increase between both routes that is caused by stronger achievement-related incentives on the challenging route. The predictor was implicit/explicit achievement motive congruence and the moderator was perceived achievement-related incentives for the climbing activity. Hence, Study 2 is a cross-sectional field study.

Again, we assessed the climbers' climbing abilities and adjusted the routes' task demands intra-personally according to their abilities. Correspondingly, we allocated the routes in a way that the climbers' first route was too easy relative to their abilities and the second route was neither too easy nor too hard. We also measured climbers' perceived task demands and abilities.

Our first two hypotheses are manipulation checks. On the one hand, we adjusted the difficulty level of each route intra-individually in order to control for different skills and abilities in the climbing activity. On the other hand, we had to make sure that the climbers actually perceived less task demands on the easy route than on the challenging route. We expected the climbers to perceive higher task demands on the challenging route than on the easy route. At the same time, the perceived abilities should not differ between the two routes. The latter assumption is a null hypothesis. Since the failure to reject the null hypothesis would not mean that the observed means in the sample were also similar in the population (Cohen, 1990; Field, 2009), we did not state this assumption as an extra hypothesis. We only formulated a hypothesis for task demands.

H_1: Climbers perceive the challenging route as more demanding than the easy route.

Moreover, it was important to know whether climbers perceived the climbing activity as achievement-related since Schüler (2010) and Schüler and colleagues (Schüler, Job, Fröhlich, & Brandstätter, 2008) have highlighted the moderating role of incentives. Therefore, we assessed the climbers' perceived incentive strengths for achievement-, power-, and affiliation-related incentives in the climbing activity. We expected stronger achievement-related incentives in the climbing activity than power- and affiliation-related incentives. This was because during the climbing activity, people deal with a standard of excellence, that is, to master the route by reaching the top.

H_2: Climbers perceive stronger achievement-related incentives than power- and affiliation-related incentives in the climbing activity.

The main research question of Study 2 is whether implicit/explicit achievement motive congruence predicts flow increase from the easy to the challenging route and whether perceived achievement-related incentives moderate this relationship.

H_{3a}: The more congruent the climbers' implicit and explicit achievement motives are, the higher is their flow increase from the easy to the challenging route.

H_{3b}: The positive relationship between achievement motive congruence and flow increase is stronger for climbers who perceive strong achievement-related incentives in the climbing activity compared to climbers who perceive weak achievement-related incentives.

4.1. Methods of Study 2

In Study 2, we observed indoor wall climbers again and measured almost the same variables as in Study 1. However, there were some differences in measures and procedure in Study 2. First, we assessed the implicit achievement motive, but this time using the Multi-Motive-Grid (MMG) instead of the Picture Story Exercise (PSE). Second, we examined the explicit achievement motive using the Personality Research Form (PRF). Third, we assessed perceived achievement-related incentives for the climbing activity in general but did not compare them between the routes as in Study 1. Instead, we assessed perceived power- and affiliation-related incentives for the climbing activity in addition to achievement-related incentives. We aimed to compare the relative strength between achievement-, power-, and affiliation-related incentives in the climbing activity. Fourth, we administered the flow short scale while climbers were still climbing the wall

and right after they got back to the ground. In Study 1, we had only measured flow experience after climbers had arrived back to the ground. For a general description of the climbing activity, see Chapter 3.1.1 in Study 1.

4.1.1. Participants. We observed *N* = 30 indoor wall climbers (9 females; 21 males) who were between 19 and 47 years old (*M* = 28.93; *SD* = 7.62). All participants were from Munich or the greater Munich area. Sixteen participants (53%) were university students, two participants (7%) were pupils in their last year of high school, and twelve participants (40%) were employed. Nine of those who were employed had a university degree.

The experimenter was a certified climbing teacher who made sure that participants were skilled enough to take part in this study without any danger for themselves. The experimenter only accepted participants whose redpoint level was *level 5* or higher on the UIAA scale (see above). This was to ensure that the climbers would be able to manage the two different routes, to reduce dropout, and of course for safety reasons. The participants' redpoint levels lay between *level 5* and *level 9-* on the UIAA-Scale, which is an average of *level 7* (*M* = 7.03; *SD* = 0.77). Their onsight levels lay between *level 5-* and *level 8* on the UIAA-Scale, which is an average of *level 6+* (*M* = 6.24; *SD* = 0.80). Hence, it seems to be justified to characterise the sample as experienced climbers. As a compensation for their participation, climbers received individual feedback about their motive structure after the study was over.

4.1.2. Measures. Prior to the climbing activity at the climbing wall, we assessed the implicit achievement motive using the Multi-Motive Grid (MMG), the explicit achievement motive using the Personality Research Form (PRF), and perceived activity-related incentives for climbing using the Incentive Theme Scales. At the climbing wall, we measured perceived task demands, perceived abilities, and flow experience using the Flow Short Scale. The next paragraphs explain the measures in more detail.

4.1.2.1. Implicit Achievement Motive. We assessed the implicit achievement motive using the MMG (Schmalt, Sokolowski, & Langens, 2000; Sokolowski, Schmalt, Langens, & Puca, 2000). The MMG is a semi-projective measure which combines the advantage of using pictures to arouse unconscious motives with the advantages of questionnaires such as being more objective and easy to measure (Schüler, 2010; Sokolowski et al., 2000). The MMG consist of 14 ambiguous pictures of social encounters. These pictures are made to arouse the implicit achievement, power, and affiliation motives. For every picture, subjects rate a certain number of statements according to whether the statements fit the picture or not. The statements represent emotions, cognitions, and actions related to a specific motive domain. A statement in the

achievement domain would be “Feeling confident to succeed at this task”, in the power domain would be “Trying to influence other people”, and in the affiliation domain would be “Feeling good about meeting other people” (Sokolowski et al., 2000).

The MMG has been shown to be a reliable measure. The re-test reliabilities for hope of success have been shown to be satisfactory (r_{tt} = .82-.88) and the internal consistencies are sufficient (α = .69-.84) (Sokolowski et al., 2000). In Study 2, we found an internal consistency for the hope of success scale of α = .69. The rather moderate internal consistencies are the result of a picture and item selection that aimed to achieve heterogeneity rather than homogeneity in the item pool (Schmalt et al., 2000).

Moreover, the MMG has been shown to possess a satisfactory factorial, convergent, discriminant, and a good external validity (Sokolowski et al., 2000). In addition, empirical findings and theoretical considerations suggest that the MMG has sufficient construct validity and hence measures implicit motives correctly (for a review, see Kehr, 2004b). For example, MMG motives do not correlate or correlate only weakly with explicit motives (i.e., Schüler, 2010). The MMG has been successfully used in various studies that underline its predictive validity (i.e., Müller, 2010; Job, Oertig, Brandstätter, & Allemand, 2010; Puca & Schmalt, 1999; Puca & Schmalt, 2001; Schiepe-Tiska et al., 2011; Schüler, 2007; Schüler et al., 2008).

4.1.2.2. Explicit Achievement Motive. We assessed the explicit achievement motive using the German version of Jackson’s (1984) Personality Research Form (PRF) (Stumpf, Angleitner, Wieck, Jackson, & Beloch-Till, 1985). “The PRF is the most commonly used questionnaire to assess explicit achievement, power, and affiliation motives” (Job et al., 2010, p.14). Its development was mostly based on Murray’s (1938) theory of personality (Hofer, Busch, Chasiotis, & Kiessling, 2006; Schultheiss & Brunstein, 2001). For this study, we used only the achievement subscale, consisting of 16 true-false self-report statements such as “I enjoy doing things which challenge me”. The sum of positive answers was used as the explicit achievement motive measure. The German PRF scales have been shown to possess high factorial validity, acceptable internal consistency (α = .67-.70) as well as a satisfying re-test reliability (r_{tt} = .69) for a three-year interval (Stumpf & Angleitner, 1989). In Study 2, we found an internal consistency for the achievement scale of α = .63. The PRF has been successfully used in various studies (i.e., Brunstein & Maier, 2005; Hofer et al., 2006; Job et al., 2010; Kehr, 2004a; Schultheiss & Brunstein, 2001).

4.1.2.3. Perceived Activity-Related Incentives. We measured the perceived incentives for the climbing activity using the *Incentive Theme Scales* constructed by Schattke et al. (2009; Lindlacher, 2010). The scales assess how strongly a person

perceives achievement-, power-, and affiliation-related incentives in a certain activity or situation. The development of the achievement scale has been already described in Study 1 (Chapter *3.1.3.2*). The development of the power and affiliation scales followed the same idea of deriving the items from the literature on implicit motives.

The implicit power motive "is conceptualized as a desire to influence, control, or impress others and, as a corollary, to receive acclaim or at least recognition for these power-motivated behaviors" (Fodor, 2010, p. 3). Hence, if an activity provides the opportunity to have *impact* on others, *control* others, or to gain *prestige* and fame, it will provide strong power-related incentives. Thus, we used the following three items to assess the power incentive strength. (1) "*While climbing a route, one can have impact on others*" (Beim Klettern einer Route kann man Einfluss auf andere haben). (2) "*While climbing a route, one can gain prestige and fame* (Beim Klettern einer Route kann man Ansehen und Prestige gewinnen)." (3) "*While climbing a route, one can control others* (Beim Klettern einer Route kann man Kontrolle über andere haben)."

The implicit affiliation motive "is defined as a concern with establishing, maintaining, or restoring a positive emotional relationship with another person or group" (Weinberger, Cotler, & Fishman, 2010, p. 72; cf. Atkinson, Heyns, & Veroff, 1958; Heyns, Veroff, & Atkinson, 1958). It includes establishing social interactions and getting in contact with other people (Sokolowski & Heckhausen, 2008). Hence, if an activity provides the opportunity to meet other people, initiate relations with others, or to maintain friendships, it will provide strong affiliation incentives. Thus, we used the following three items to assess the affiliation-related incentive strength. (1) "*While climbing a route, one can meet other people*" (Beim Klettern einer Route kann man andere Leute kennen lernen). (2) "*While climbing a route, one can initiate relations with others* (Beim Klettern einer Route kann man Beziehungen zu Anderen aufbauen)." (3) "*While climbing a route, one can maintain friendships* (Beim Klettern einer Route kann man Freundschaften pflegen)."

The items were answered on a 1–7 scale with 1 indicating the statement "*is not true*", 4 indicating "*partially*", and 7 indicating "*is true*". In this study, (power: $\alpha = .83$, affiliation: $\alpha = .91$) the internal consistencies were satisfactory. More importantly, a confirmatory factor analysis indicated a good factorial validity (Schattke et al., 2009).

4.1.2.4. Perceived Task Demands and Perceived Abilities. We assessed perceived task demands and perceived abilities using the same items as in Study 1 (see Chapter *3.1.3.3*). We measured perceived task demands and perceived abilities only once, after climbers had returned to the ground.

4.1.2.5. Flow Experience. We assessed flow experience using the *Flow Short Scale* (Rheinberg et al., 2003) as described in Study 1 (Chapter *3.1.3.4*). In this study however, we did not distinguish between fluency of performance and absorption by activity. We used the overall score to measure flow experience, which we measured twice on each route. The internal consistencies for the four flow measurements were between α = .82 and α = .90.

4.1.3. Procedure. The experimenter, a certified climbing teacher, recruited participants at the climbing wall. If people volunteered to participate, the experimenter would make an appointment with them for the data collection at the climbing wall. She also informed them that they had to fill in an online questionnaire prior to the climbing session. Participants filled in the online questionnaire from home before carrying the climbing activity out. In this online questionnaire, we assessed implicit and explicit motives, perceived activity-related incentives for climbing as well as the participant's age, sex, and climbing experience. The climbers were informed that their participation was voluntary, and that they could stop their participation in the study at any time. The online pre-test took about 25-30 minutes.

At the climbing wall, the experimenter explained the procedure and introduced the climbers to the questionnaire. It was particularly important that the climbers were familiar with the flow questions because the experimenter asked the questions using a radio headset while the climbers were still on the wall. In addition, the experimenter asked for the climbers' redpoint and onsight performance level (see Chapter *3.1.1.2* for further explanation) in order to decide which routes they should climb. After deciding which routes the respective participant would climb, the experimenter and the climber agreed on which position the experimenter should administer the flow questions using the radio headset. This was typically after two thirds of the route so that the climbers would get used to the route before answering the flow questions.

The experimenter observed each participant on two different routes. First, participants climbed an easy route for warming up. Second, they climbed a challenging route. The difficulties between these two routes differed significantly on the UIAA-Scale ($t(29) = -16.03$. $p < .001$. $r = .95$). The first route was easy ($M = 4.71$; $SE = 0.16$). The level on the UIAA-Scale of the easy route was clearly below the climbers' redpoint performance level as reported in Chapter 4.1.1. Climbers used such a route for warming up. The second route had a medium difficulty level ($M = 6.60$; $SE = 0.14$). It was neither too easy nor too hard but still demanding. The UIAA-level of the second route was between the climbers' redpoint and onsight performance level (Chapter 4.1.1). All climbers succeeded the easy (Route 1) and challenging route (Route 2).

In each session, the experimenter observed two climbers. One was climbing while the other one was belaying the current climber and recovering from climbing at the same time. The experimenter observed the climbers and filled in a protocol list. After two thirds of the route, the climber took a break and secured him- or herself to the closest quickdraw. Then, the experimenter asked the ten flow questions using the radio headset. The climber answered by telling the experimenter the respective number on a seven-point scale for each question. After that, the climber continued climbing the rest of the route. Immediately after a climber finished a route and was back on the ground, the experimenter administered the flow questionnaire for the second time including the questions about perceived task demands and abilities. Finally, the other participant climbed his or her respective route. See Lindlacher (2010) for a more detailed description of the procedure.

4.2. Results of Study 2

The aim of Study 2 was to demonstrate the impact of implicit/explicit achievement motive congruence on flow increase from an easy to a challenging route and the moderating role of perceived achievement-related incentives. First, we present the descriptive statistics of all measures. Second, we present the test statistics for our control variables and main hypotheses.

4.2.1. Descriptive Results. Table 3 shows the psychometric properties of the major variables included in Study 2. It shows that the means for task demands were higher on the challenging route than on the easy route. In comparison, the mean values for perceived abilities were rather similar between both routes. Furthermore, the mean values for perceived incentives were highest for achievement, followed by affiliation, and power.

Flow experience was measured twice on each route; first, while climbers were still on the wall and second, right after returning to the ground. On the easy route, the mean value for flow experience measured on the wall was M = 4.95 (SD = 0.82) on a seven-point scale. The mean value for flow experience measured on the ground was M = 4.88 (SD = 0.97) and did not differ significantly from the measurement on the wall (t(29) = .86, p = .40, r = .16). On the challenging route, the mean value for flow experience measured on the wall was M = 5.40 (SD = 0.70). The mean value for flow experience measured on the ground was M = 5.52 (SD = 0.72) and did not differ significantly from the measurement on the wall (t(29) = -1.87, p = .07, r = .33). Moreover, all four flow values were above the potential scale mean of “4”. When transferring the flow means in T-

values[8], it shows that climbers experienced flow in a "normal" range between the mean (*M* = 50) and half a standard deviation (*SD* = 10) above the mean of the *T*-distribution. On the easy route, the mean *T*-values for the measurement on the wall was *T* = 50.23 and *T* = 49.90 on the ground. On the challenging route, the mean *T*-values for the measurement on the wall was *T* = 54.06 and *T* = 55.03 on the ground.

Table 3

Psychometric Properties of all Major Variables in Study 2

Variable	*M*	*SD*	α	Range	
				Potential	Actual
Task Demands					
Route 1 - Easy Route	3.10	1.49	-	1-9	1-7
Route 2 - Challenging Route	6.10	1.65	-	1-9	1-8
Perceived Abilities					
Route 1 - Easy Route	5.13	1.33	-	1-9	2-7
Route 2 - Challenging Route	5.37	1.33	-	1-9	2-7
Perceived Incentives					
Achievement	6.39	0.65	.55	1-7	4.67-7.00
Power	3.29	1.46	.81	1-7	1.33-6.67
Affiliation	5.00	1.44	.83	1-7	1.67-7.00
Achievement Motive					
Implicit	7.53	2.35	.69	0-12	4-12
Explicit	10.60	2.61	.63	0-16	2-14
Congruence	3.76	0.98	-	-	0.00-4.78
Flow Experience					
Route 1 - Easy Route	4.92	0.87	.87	1-7	3.05-6.80
Route 2 - Challenging Route	5.46	0.69	.84	1-7	3.75-5.46

Note. N = 30. Table 3 shows the means, standard deviations, the cronbach's alphas, and the ranges of the scales used in Study 2. The flow scales are mean values of the two measurements on each route.

[8] *T*-values were retrieved from Rheinberg (2004).

These findings suggest that the climbers experienced a meaningful amount of flow on the two routes. Furthermore, it did not make a significant difference whether we measured flow while climbers where on the route or had returned to the ground. Both measurements correlated strongly (*r*s = .88, *p*s < .01) with each other. We thus calculated the means of both measurements and used those values for testing our hypotheses (see Table 3).

Finally, we calculated the achievement motive congruence measure. As expected, implicit and explicit motives were independent from each other (r = -.02, p = .92). To calculate the motive congruence measure, we standardised the implicit and explicit achievement motive using *z*-scores. We then calculated absolute differences between those scores to create a discrepancy score. To transfer the discrepancy score into a congruence measure, we recoded the discrepancy score by subtracting the discrepancy variable from the maximum value of this sample (*Max* = 4.78). In the resulting congruence measure, high values indicate a good fit between the implicit and explicit achievement motive whereas low values indicate a bad congruence between the motives. Achievement motive congruence was statistically independent from the implicit achievement motive (r = -.19, p = .32) but correlated moderately with the explicit achievement motive (r = .37, p < .05).

Table 4 presents the bivariate correlations between all measures. Flow experience on the easy and the challenging route correlated positively with each other (r = .71, p < .01). Furthermore, task demands on both routes also correlated positively with each other (r = .64, p < .01) as well as with abilities (r = .81, p < .01). The perception of achievement-related incentives correlated negatively with flow experience on the easy route (r = -.37, p < .05). Furthermore, flow experience on the challenging route correlated negatively with task demands on the challenging route (r = -.41, p < .05) but positively with abilities on the easy (r = .57, p < .01) and challenging routes (r = .45, p < .05). Finally, the explicit achievement motive correlated positively with flow experience on the challenging route (r = .41, p < .05) but not on the easy route (r = .14, p = .46). Interestingly, the explicit achievement motive correlated positively with abilities on both routes (both *r*s = .52, *p*s < .05). Climbers who described themselves as achievement motivated also perceived themselves as skilled in the climbing activity.

Table 4

Correlations of all Major Variables in Study 2

Variable	2	3	4	5	6	7	8	9	10	11	12
1. Task Demands Route 1	**.64**	-.01	-.05	.07	.01	.01	-.04	-.02	-.22	-.03	-.14
2. Task Demands Route 2	-	-.31	-.22	.27	.28	-.18	.16	-.18	-.16	-.18	**-.41**
3. Abilities Route 1		-	**.81**	-.06	-.09	-.05	-.17	**.52**	.12	**.37**	**.57**
4. Abilities Route 2			-	.04	-.00	.04	-.13	**.52**	.12	.30	**.45**
5. Achievement Incentives				-	.33	.17	.26	-.10	-.10	**-.37**	.01
6. Power Incentives					-	.19	**.42**	-.20	-.14	.01	-.09
7. Affiliation Incentives						-	-.05	.04	-.06	-.16	-.04
8. Implicit Achievement Motive							-	-.02	-.19	-.17	-.07
9. Explicit Achievement Motive								-	**.37**	.14	**.41**
10. Motive Congruence									-	-.07	-.16
11. Flow Route 1										-	**.71**
12. Flow Route 2											-

Note. $N = 30$. Bold values indicate significant correlations. rs > .37. $p < .05$, rs > .52, $p < .01$ (two-tailed).

4.2.2. Main Hypotheses. Before testing our main hypotheses concerning flow experience, we tested whether climbers perceived the two routes regarding task demands and perceived incentives in the expected way. We assumed that climbers perceived the challenging route as more demanding than the easy route (Hypothesis 1). At the same time we expected no differences in perceived abilities. We did not formulate an extra hypothesis for the latter assumption, since this is a null hypothesis. The failure to reject this null hypothesis would not mean it was true (Cohen, 1990).

To test Hypothesis 1, we intended to calculate a dependent *t*-test. However, since the assumption of normality of differences was violated indicated by a Kolmogorov-Smirnov test ($D(30) = .23$, $p < .001$), we ran the non-parametric Wilcoxon test instead. As already reported in the descriptive results section, participants experienced stronger task demands on the challenging route (*Mdn* = 6.50) than on the easy route (*Mdn* = 3.00). This difference was significant ($z = -4.75$, $p < .001$, $r = .61$), which supports Hypothesis 1. As expected, the similar values for abilities on the challenging (*Mdn* = 5.00) and the easy route (*Mdn* = 5.00) did not differ significantly from each other ($z = -1.51$, $p = .13$, $r = .20$). These results support our notion that climbers actually perceived the challenging route as more difficult than the easy route but perceived themselves as equally skilled on both routes.

Hypothesis 2 stated that climbers perceived stronger achievement-related incentives than power- and affiliation-related incentives for climbing. The descriptive results indicated that this was the case. The mean for achievement-related incentives was higher ($M = 6.39$, $SD = 0.65$) than for power- ($M = 3.29$, $SD = 1.46$) and affiliation-related incentives ($M = 5.00$, $SD = 1.44$). In addition, these differences were statistically significant ($F(2, 58) = 57.86$, $p < .001$, $r = .81$). Contrasts revealed that wall climbers perceived stronger achievement-related incentives than power- ($F(1, 29) = 150.40$, $p < .001$, $r = .92$) and affiliation-related incentives ($F(1, 29) = 26.68$, $p < .001$, $r = .69$). In conclusion, the climbers perceived the climbing activity mainly as an achievement-related activity. This confirms Hypothesis 2. *Figure 8* illustrates this finding.

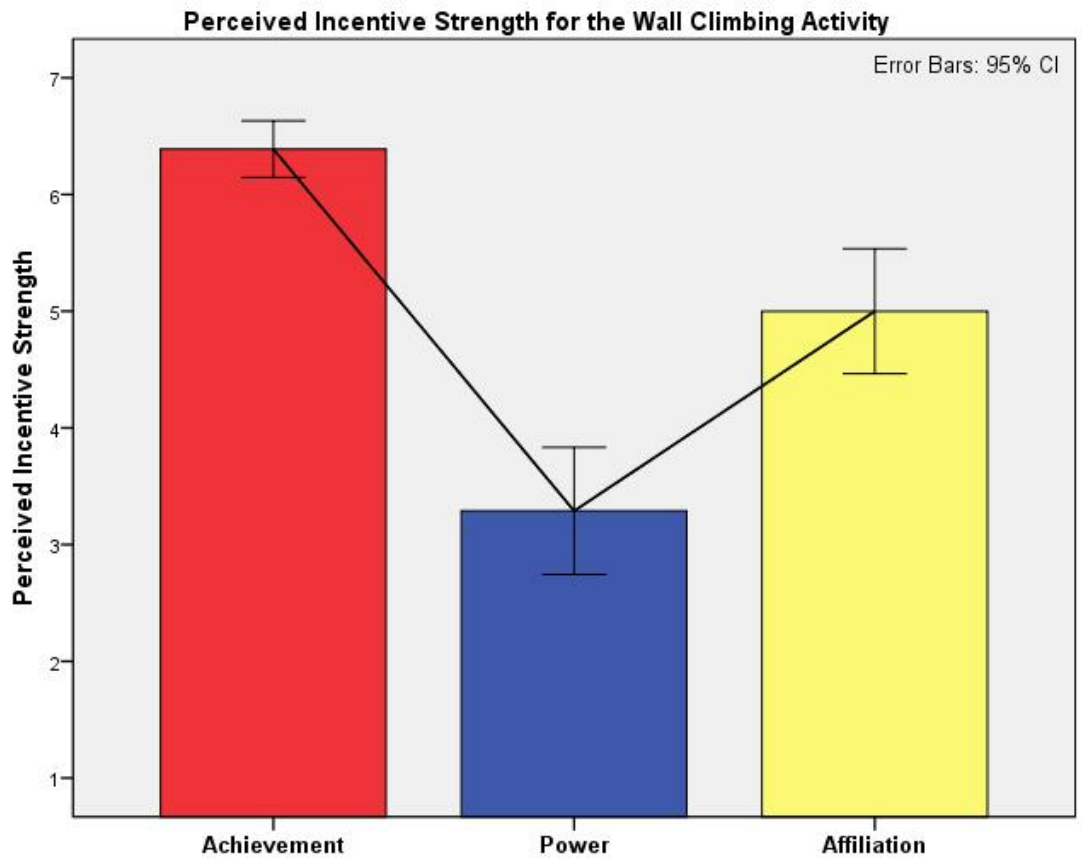

Figure 8. Perceived Incentive Strength for Achievement, Power, and Affiliation. Climbers perceived stronger achievement-related incentives than power- and affiliation-related incentives for the climbing activity.

Finally, Hypothesis 3a stated that the higher the climbers' implicit/explicit achievement motive congruence was the higher would be their flow increase from the easy to the challenging route. Hypothesis 3b stated that this relationship would be particularly strong for climbers who perceived strong achievement-related incentives in the climbing activity. Before testing the hypotheses about flow increase, we tested whether climbers actually experienced more flow on the challenging route than on the easy route. A dependent *t*-test reached significance ($t(28) = -4.82$, $p < .001$, $r = .67$) and revealed that climbers experienced more flow on the challenging route ($M = 5.46$, $SE = 0.13$) than on the easy route ($M = 4.91$, $SE = 0.16$).

To test Hypotheses 3a and 3b, we performed a hierarchical multiple linear regression analysis using flow experience on the challenging route as the dependent variable. In Step 1, we controlled for flow experience on the easy route. In Step 2, we included achievement motive congruence and the perceived achievement-related incentives for climbing. In Step 3, we included the interaction between achievement motive congruence and achievement-related incentives. Table 5 presents the results.

Table 5

Hierarchical Multiple Regression Analysis for Flow Experience on the Easy Route, Implicit/Explicit Achievement Motive Congruence, Perceived Achievement-Related Incentives, and their Interaction on Flow Experience on the Challenging Route

Predictor	Flow Experience on the Challenging Route			
	ΔR^2	*B*	*SE B*	β
Step 1	.50***			
Constant		0.00	0.12	
Flow Experience on the Easy Route		0.71	0.13	.71***
Step 2	.11*			
Constant		0.00	0.12	
Flow Experience on the Easy Route		0.82	0.13	.82***
Achievement Congruence		0.13	0.12	.13
Achievement Incentives		0.33	0.13	.33*
Step 3	.06*			
Constant		0.04	0.12	
Flow Experience on the Easy Route		0.81	0.12	.81***
Achievement Congruence		0.17	0.12	.17
Achievement Incentives		0.29	0.13	.29*
Achievement Incentives × Congruence		0.36	0.17	.26*
Total R^2	.67***			

Note. $N = 30$. *$p < .05$. **$p < .01$. ***$p < .001$. Achievement-related incentives and their interaction with motive congruence predict flow experience on the challenging route controlling for flow experience on the easy route. Step 1: $F(1, 29) = 27.73$, $p < .001$, $R^2 = .50$. Step 2: $F(3, 29) = 13.19$, $p < .001$, $R^2 = .60$. Step 3: $F(4, 29) = 12.55$, $p < .001$, $R^2 = .67$.

Step 1 indicated a significant relationship of flow experience on the easy with flow experience on the challenging route ($\Delta F(1, 28) = 27.73$, $p < .001$, $\Delta R^2 = .50$) indicating that flow experience on both routes were strongly related (β = .71, $p < .001$). Step 2 explained significantly more variance ($\Delta F(2, 26) = 3.47$, $p < .05$, $\Delta R^2 = .11$). However, contrary to our expectations, achievement motive congruence did not predict flow experience on the challenging route (β = .13, $p = .30$) but perceived achievement-related incentives did (β = .33, $p < .05$). The stronger the achievement-related incentives were the higher was their flow experience on the challenging route when controlling for the easy route. This effect remained stable in Step 3. In addition, the interaction between achievement motive congruence and achievement-related incentives (β = .26, $p < .05$) reached significance

explaining 6% of additional variance ($\Delta F(1, 25) = 4.82$, $p < .05$, $\Delta R^2 = .06$). To illustrate the interaction, we used simple slope tests at values of one standard deviation above and below the means of achievement motive congruence and achievement-related incentives (Aiken & West, 1991; Cohen, Cohen, West, Aiken, & Cohen, 2003) as depicted in Figure 9.

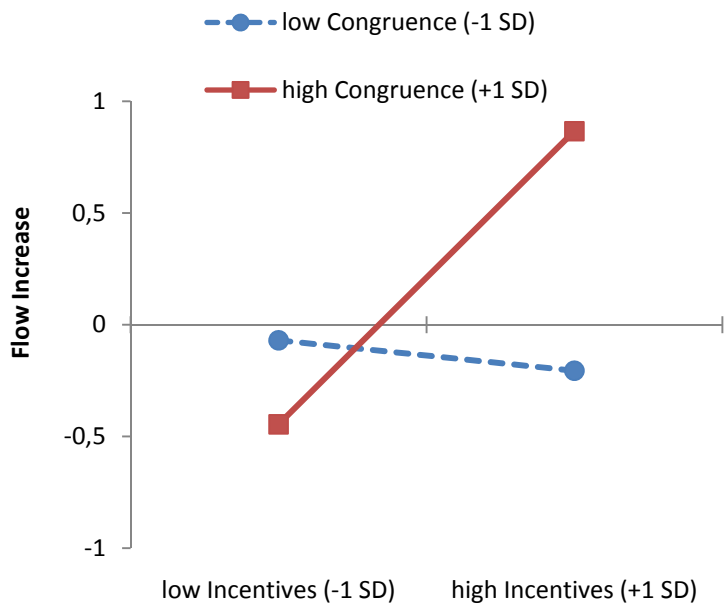

Figure 9. Interaction of Achievement Motive Congruence with Perceived Achievement-Related Incentives on Flow Experience on the Challenging Route Controlling for Flow Experience on the Easy Route. Controlling for flow experience on the easy route represents an increase of flow experience from the easy to the challenging route. The figure depicts the flow increase at values of one standard deviation above and below the means of achievement motive congruence and achievement-related incentives.

Simple slope analyses revealed that that only the slope for high achievement motive congruence was different from zero ($b = 0.66$, $SE = 0.19$, $t(26) = 3.41$, $p < .01$) but not the slope for low achievement motive congruence ($b = -0.07$, $SE = 0.22$, $t(26) = 0.31$, $p = .76$). In other words, only climbers with high achievement motive congruence who perceived strong achievement-related incentives experienced a flow increase from the easy to the challenging route. The same results occurred when controlling for perceived abilities. This confirms Hypothesis 3b but not Hypothesis 3a.

4.3. Discussion of Study 2

The main research question of Study 2 was to investigate whether implicit/explicit achievement motive congruence was associated with flow increase from an easy to a challenging climbing route and whether this relationship was moderated by perceived achievement-related incentives. Control variables confirmed that climbers perceived the

challenging route as more demanding than the easy route. At the same time, the perceived abilities did not differ between the two routes. This finding, in combination with the absolute values of perceived task demands and abilities, indicate that the easy route was too easy for the climbers, whereas the challenging route provided a perfect fit between task demands and abilities. Furthermore, climbers perceived stronger achievement-related incentives than power- and affiliation-related incentives in the climbing activity. This indicates that the climbing activity is mainly an achievement-related activity. Moreover, climbers experienced more flow on the challenging route than on the easy route. Contrary to our expectations, strong achievement-related incentives predicted this increase of flow experience but not implicit/explicit achievement motive congruence. However, we found the expected interaction between achievement motive congruence and perceived achievement-related incentives in the sense that only climbers with high achievement motive congruence experienced a flow increase from the easy to the challenging route if they experienced strong achievement-related incentives for climbing.

Basically, the latter finding confirms our main assumption that motive congruence is associated with flow experience if the situation provides fitting incentives. This finding is in line with the classical approach to motivation. The interaction of person-situation variables leads to motivation, in this case an increase of flow experience. Furthermore, this finding adds validity to Schüler's (2010) findings. She found that achievement motive discrepancy has negative impact on flow experience, but only in situations that provide strong achievement-related incentives. Similar results were found in the affiliation domain. People with high affiliation motive congruence reported the highest emotional well-being and life satisfaction if they showed a lot of affiliation-related behaviour (Schüler et al., 2008). Schüler (2010) argues that the situational cues make the discrepancy salient and therefore trigger an intrapersonal conflict, which in turn impairs flow experience. The current research as well as Schüler et al. (2008) demonstrated the positive side of this effect. In Study 2, motive congruence fosters flow experience if it is congruent with the activity-related incentives provided by the situation. In this case, the situational cues do not trigger intrapersonal conflict but an optimal experience, which leads to an increase of flow experience from an easy route that provides only few achievement-related incentives to a challenging route that provides stronger achievement-related incentives.

According to the compensatory model of motivation and volition (Kehr, 2004b), congruence between implicit and explicit motives is associated with intrinsic motivation and flow experience if subjects perceive their abilities as sufficient. In Study 2, all these conditions were fulfilled. The climbers perceived their abilities as sufficient and motive congruence led to an increase of flow experience if climbers perceived climbing as

achievement-related. The moderating role of the achievement-related incentives can be explained by the classical approach to motivation as pointed out above. Hence, our findings support the notion that motive congruence is associated with flow experience (Kehr, 2004b; Rheinberg, 2002, 2008) but only in situations also fits the motive domain (Schüler et al., 2008; Schüler, 2010).

However, the findings also show an unexpected main effect for perceived achievement-related incentives. Climbers who experienced more achievement-related incentives in the climbing activity gained more flow experience from the easy to the challenging route than climbers who experience low achievement-related incentives. This main effect is stronger than the interaction between motive congruence and achievement-related incentives and of course as the non-significant main effect of motive congruence. Interestingly, other studies have also found main effects for activity-related incentives on flow experience, particularly with achievement-related incentives (Müller, 2010; Schattke et al., 2011). It is possible that the person variable, such as motives or motive congruence, only contributes to flow experience if the impact of the situation is rather low. Conversely, in very salient situations, the impact of motives might get overruled or shadowed by the impact of the situation, an effect often found in social psychology (Kunda, 1999).

This research has some limitations. Study 2 has only a rather small sample. As in Study 1, it was quite effortful to recruit a large number of participants in such an applied setting. Nevertheless, we found significant effects despite the small sample size, indicating that the effects were meaningful. It is possible that motive congruence would have also reached significance if the sample size had been larger.

Again, it was not possible to balance the order in which participants climbed the routes. This is less of a problem than in Study 1 because we did not compare the routes as different conditions but controlled for flow experience on the easy route. Study 2 possesses a high ecological validity because we assessed climbers' flow experience *in vivo,* i.e., directly in and right after the activity. However, the flow measurements during climbing did not differ significantly from the measurement right after climbers got back to the ground. Hence, in future, it should be sufficient to measure flow experience right after the activity rather than during the activity. The advantage is that one does not have to interrupt the activity and the associated flow experience.

Finally, this study measured implicit motives using the MMG instead of the PSE. Some researchers argue that the MMG would not measure implicit motives since it was not operant because subjects still answer questions instead of writing stories. According to Schultheiss and Pang (2007), the MMG would be considered a declarative measure

because subjects have to consciously decide whether to answer “yes” or “no”. Since Brunstein and Maier (2005) have demonstrated that explicit motives predict conscious decisions and implicit motives predict effort in tasks, one could argue that the MMG assesses rather explicit than implicit motives. However, Sokolowski et al. (2000) have pointed out that the MMG is distinct from questionnaire measures and predict similar variables as the PSE. Unfortunately, there is no systematic research comparing the predictive validity of PSE and MMG with one another. Nevertheless, the MMG has proven its predictive value in a lot of studies (i.e., Job et al., 2010; Kehr, 2004b; Schüler, 2010; Schüler et al., 2008).

Future research should address the methodological issues regarding MMG and PSE measures. In addition, this research should be repeated with a larger sample to assess whether the assumed main effect for motive congruence can be demonstrated. Moreover, more complex models including structural equation modelling or multilevel analysis should be tested which also requires larger samples. This could address methodological and theoretical issues more elaborately.

So far, most studies have looked at implicit/explicit congruence in the achievement domain (i.e., Baumann, Kaschel, & Kuhl, 2005; Hofer et al., 2010; Job et al., 2010; Langan-Fox, Sankey, & Canty, 2009; Langens, 2007; Schüler, 2010; Thrash, Elliot, & Schultheiss, 2007; Thrash & Elliot, 2002). Fewer studies have looked at implicit/explicit congruence in the affiliation domain (i.e., Hofer et al., 2006; Langan-Fox & Canty, 2010; Langan-Fox, Canty, & Sankey, 2010; Schüler et al., 2008), and only few have looked at a combined motive score (i.e., Kehr, 2004a; Schattke, et al., 2010). Only little is known about motive congruence in the power domain. Two studies compared motive congruence in different domains but did not find any positive effects for congruence in the power domain (Hofer & Chasiotis, 2003; Hofer, Chasiotis, & Campos, 2006). Further research should follow Hofer and colleagues’ example not only observing congruence in the power domain but also comparing the impact of congruence for achievement, power, and affiliation motives with one another.

In conclusion, Study 2 demonstrates that achievement motive congruence is associated with an increase of flow experience if climbers perceive strong achievement-related incentives for climbing. This highlights the importance of investigating motive congruence in combination with situational cues or activity-related incentives in order to predict consequences of motive congruence. As pointed out in the introduction, motive congruence is not only beneficial in terms of flow experience (i.e., Schüler, 2010) but also promotes other motivational (i.e., Brunstein, Schultheiss, & Grässmann, 1998), emotional (i.e., Langens, 2007), and behavioural (i.e., Job et al., 2010) outcomes. However, one

might wonder what leads to motive congruence and how does motive congruence develop? Study 3 examines the antecedents of motive congruence.

5. Study 3
Antecedents of Congruence between Implicit and Explicit Motives

Study 3[9] explores antecedents of motive congruence[10] and examines whether the experience of self-determination in childhood is associated with congruence between implicit and explicit motives later in life. Self-determination has been shown to be the most promising moderator of motive congruence (Thrash et al., 2010). According to Self-Determination Theory (SDT), self-determination results from the satisfaction of the three basic needs for autonomy, relatedness, and competence (Deci & Ryan, 2000). A feeling of being oneself, having free choices, and feeling authentic in one's actions leads to satisfaction of the need for autonomy (Koestner & Losier, 1996). A feeling of being connected with, understood by, and cared for by others leads to satisfaction of the need for relatedness (Baumeister & Leary, 1995; Deci & Ryan, 2000). Finally, a feeling of being effective, confident in one's abilities, and efficacious leads to satisfaction of the need for competence (Deci & Ryan, 2000). A lot of research has shown that the three basic needs are fundamental throughout various situations, domains, and cultures (Deci & Ryan, 2000; Sheldon, Elliot, Kim, & Kasser, 2001). Furthermore, research has shown that basic need satisfaction is related with internalisation, integration, and personality coherence (Koestner, Bernieri, & Zuckerman, 1992; Sheldon & Kasser, 1995).

This research aims to examine whether basic need satisfaction of autonomy, relatedness, and competence in early childhood is associated with motive congruence later in life. For that purpose, Schattke et al. (2010) re-analysed longitudinal data, originally collected by Sears, Maccoby, and Levin (1957) and followed up by McClelland and Pilon (1983). When participants were five years old, their mothers were interviewed about their childrearing patterns and their relationship with their child. When the participants were 31 years old, McClelland and Pilon (1983) collected data about their implicit and explicit motives. We used these data to calculate a motive congruence measure and analysed it in terms of childhood correlates associated with basic need satisfaction. We expected that childhood environments that support the experience of autonomy, relatedness, and competence would be positively associated with congruence between implicit and explicit motives for achievement, power, and affiliation. Childhood

[9] We published Study 3 already (Schattke, Koestner, & Kehr, 2010) in a special issue on implicit motives in *Motivation and Emotion*. Hence, we describe this research only briefly.

[10] Schattke et al. (2010) use the term "incongruence" in their article. For consistency reasons and to underline the positive connotation of motive congruence in relation to the flow concept as described in Study 1 and 2, we continue using "congruence" rather than "incongruence" or "discrepancies" throughout the dissertation.

factors that thwart the experience of autonomy, relatedness, and competence should be negatively associated with motive congruence.

The archival dataset did not provide measures that were constructed to capture the concept of the basic need satisfaction. However, we were able to locate proxy variables in the dataset that represent childhood experiences of the needs for autonomy and relatedness. Unfortunately, we did not find any proxy variables that represent childhood experiences for the need for competence.

5.1. Methods of Study 3

5.1.1. Participants. Originally, Sears et al. (1957) interviewed *N* = 379 mothers from white two-parent households in the Boston area about their five-year old children. For the current research, we observed a representative subsample of *N* = 75 participants (38 women, 37 men) drawn by McClelland and Pilon (1983) when the participants were 31 years old.

5.1.2. Childhood Factors. Experienced interviewers asked questions related to the mother's child rearing patterns as well as to their emotions toward the child. The resulting interview transcripts were coded by two extensively trained raters on more than 100 dimensions (for further details see Sears et al., 1957). The inter-rater reliabilities for all measures used in this study were at least α = .80 or higher. Furthermore, Koestner, Franz, and Weinberger (1990) condensed 42 mother ratings into six parenting rating factors used in this study. The factors were *mother warmth*, *mother strictness*, *mother restricts sexuality*, *mother discourages dependency*, *mother inhibits aggression*, and *mother role satisfaction*. Furthermore, we used two mother ratings of the children's behaviour. These two ratings were *child sociability* and *child dominance*. Finally, three *child separation from mother* variables were obtained referring to different age periods of the child. The child separation variables were: separation from mother during the child's *first 9 months*, between the ages of *10 to 24 months*, and between *24 and 60 months*.

5.1.3. Implicit and Explicit Motives. The *N* = 75 participants who were followed up by McClelland and Pilon (1983) filled in a variety of personality questionnaires such as the Adjective Checklist (ACL) (Gough & Heilbrun, 1965, 1983) to measure the explicit motives for achievement, power, and affiliation as well as operant measures such as the Picture Story Exercise[11] (PSE) (Pang 2010a) to measure the implicit motives for

[11] Schattke et al. (2010) as well as McClelland and Pilon (1983) used the term "TAT" rather than "PSE". The term "TAT" actually refers to a set of pictures used for clinical purposes whereas the term "PSE" refers to a set of pictures combined with an empirically derived scoring system used early in motivation research to arouse the implicit motives for achievement, power, and affiliation (Pang & Schultheiss, 2005). McClelland (1987) originally used the term "PSE" (cf. McClelland, et al., 1989; Koestner & McClelland, 1992) as well as

achievement, power, and affiliation. The inter-rater reliability for the PSE was at least 85% agreement with expert coding. The internal consistencies for the ACL scales were at least α = .78 (see Schattke et al., 2010).

5.1.4. Motive Congruence. To derive the motive congruence variable, we proceeded in the same manner as in Study 2 (see Chapter 4.2.1). First, we standardised all implicit and explicit motive scores. Second, we calculated absolute difference scores between the implicit and explicit measures for achievement, power, and affiliation. To obtain an overall index across all three motive domains, we calculated the mean of the three absolute differences scores. The same procedure has been used in several other studies working with motivationally relevant discrepancy scores (i.e., Boldero & Francis, 2000; Brunstein et al., 1998; Gramzow, Sedikides, Panter, & Insko, 2000; Higgins, 1998; Kehr, 2004a; Schüler, 2010). In this dissertation, we recoded the discrepancy score by subtracting the discrepancy variable from the maximum value of the sample (*Max* = 2.85). In the resulting congruence measure, high values indicate a good fit between implicit and explicit motives whereas low values indicate a bad concordance. For further details about the method see Schattke et al. (2010).

5.2. Results of Study 3

First, we tested whether implicit and explicit motives were independent from each other. In all three motive domains, implicit and explicit motives were unrelated (achievement: r = -.16, p = .21, power: r = -.08, p = .38, affiliation: r = .06, p = .60). As explained in the introduction, this is a typical pattern obtained in research about implicit and explicit motives (cf. Köllner & Schultheiss, 2011; Spangler, 1992).

Second, we argue, that motive congruence is conceptually different from the actual implicit and explicit motives. Hence, implicit and explicit motives should not correlate with motive congruence. In the achievement domain, neither the implicit (r = -.05, p = .68) nor the explicit motive (r = .15, p = .26) correlated significantly with the congruence measure. In the power domain, neither the implicit (r = -.09, p = .43) nor the explicit motive (r = .17, p = .13) correlated significantly with the congruence measure. And also in the affiliation domain, neither the implicit (r = -.01, p = .91) nor the explicit motive (r = -.04, p = .76) correlated significantly with the congruence measure. Therefore, we conclude that our congruence measure is different from implicit and explicit motives. Motive congruence represents how well a person's affective and cognitive preferences are in line with each other.

recent publications using this measure (i.e., Pang, 2010a; Schultheiss & Pang, 2007). Hence, we use the term "PSE" here, too.

Third, we examined whether childhood environments that thwart basic need satisfaction would be negatively associated with motive congruence. To test these assumptions, we conducted a multiple regression analysis to examine the impact of the different childhood factors on motive congruence. The three mother separation variables, the six mother parenting factors, and the two children's behaviour factors were simultaneously entered as predictors. Motive congruence was the dependent variable.

Table 6

Multiple Regression Analysis for Childhood Factors on Adults' Levels of Implicit/Explicit Motive Congruence

	Motive Congruence		
Predictors	*B*	*SE B*	β
Mother Separation first 9 months	.09	.07	.15
Mother Separation 9-24 months	-.11	.04	-.30*
Mother Separations 2 to 5 years	-.02	.03	-.07
Mother Inhibition of Sexuality	-.01	.01	-.27*
Mother Discourages Dependency	-.01	.01	-.24*
Mother Inhibits Aggression	.01	.01	.21
Mother Warmth	-.01	.01	-.12
Mother Strictness	.01	.01	.09
Mother Role Satisfaction	-.01	.01	-.18
Child Dominance	-.19	.08	-.31*
Child Sociability	.02	.09	.03

Note. $N = 74$. $^{*}p < .05$. $^{**}p < .01$. $^{***}p < .001$. The childhood factors *mother separation 9-24 months*, *mother inhibition of sexuality*, *mother discourages dependency*, and *child dominance* negatively predicted motive congruence in adulthood. $R^2 = .33$, $F(11, 62) = 2.77$, $p < .01$.

Table 6 shows the results of the regression analysis. In total, the model significantly explained 33% of variance in motive congruence at age 31 ($R^2 = .33$, $F(11, 62) = 2.77$, $p < .01$). Specifically, the variables *separation from mother between 9 and 24 month* (β = -.30, $p < .05$), *mother inhibits sexuality* (β = -.27, $p < .05$), *mother discourages dependency* (β = -.24, $p < .05$), and *child dominance* (β = -.31, $p < .05$) negatively predicted motive congruence at age 31. In other words, people were less likely to become motive-congruent at age 31 if they were separated from their mother between 9 and 24 month, if the mother inhibited their impulses of sexuality, if the mother discouraged dependency, and if the child dominated the family. In essence, these findings support our basic

assumption that childhood environments that represent basic need satisfaction will be associated with congruence between implicit and explicit motives later in life (cf. Schattke et al., 2010).

5.3. Discussion of Study 3

Study 3 was based on the publication of Schattke et al. (2010) who had re-analysed archival longitudinal data from five-year old children and their mothers to investigate relationships of childhood experiences with congruence between implicit and explicit motives 26 years later. We expected that childhood environments that satisfy or thwart basic needs for autonomy, relatedness, and competence would be associated with motive congruence in the achievement, power, and affiliation domain. We found that childhood experiences that thwarted the experience of autonomy, in the sense that the mother restricted the children's sexuality or discouraged their attempts for dependency had a negative impact on motive congruence at age 31. In addition, childhood experiences that thwarted the experience of relatedness, in the sense that the mother was often physically separated from the child between the 9-24 months and that the child dominated the mother, also had a negative impact on motive congruence at age 31. The other predictors did not reach significance.

The *mother restricts sexuality* factor implies that the mother forbids her child to be without clothes indoors, bans masturbation, insists strictly on modesty, strictly interdicts sex play, and that the mother has high level of sex anxiety. The *mother discourages dependency* factor implies restrictiveness regarding dependency in the sense of search for contact and relation, punishment of dependent acts, and mother's irritation as a result of her child's dependent responses (Koestner et al, 1990). If autonomy characterises a feeling of being oneself, having free choices, and being authentic in one's actions, then "excessive inhibition of a young child's sexual and dependent impulses" (Schattke et al., 2010, p. 8) as described above, will dissatisfy the need for autonomy. By inhibiting the children's impulses, children will learn to focus on the social expectations of the environment rather than on their own affective impulses.

The *child dominance* factor implies that the child controls the mother by temper tantrums, withdrawal of love, keeping after the mother, or even threats (Koestner et al., 1990). If the need for relatedness represents a feeling of being connected with, understood by, and cared for by others, then a relationship between mother and child where the child dominates the mother will not satisfy that need.

> "*A mother–child relationship in which the mother feels dominated by the child reflects a helpless and overwhelmed stance by the mother in relation to her*

> *child. A helpless mother is unlikely to be able to effectively transmit important values and goals, and, moreover, is unlikely to have the kind of trusting but authoritative relationship that is required to help a child integrate external values and goals with intrinsic affective tendencies*" (Schattke et al., 2010, p. 8).

The *child separation from mother* factor ranged from "no separation" to "mother home only intermittently" (i.e., weekends) (Koestner et al, 1990). The more often a mother is not available for the child, the more difficult it will be to establish a connection and maintain a relationship for both. Interestingly, this factor was only significant between 9-24 months. "It is at around 9–12 months that infants begin to experience separation anxiety and display marked distress because of even brief separations from their caregiver" (Schattke et al., 2010, p. 8). The need for relatedness may be dissatisfied particularly easily at that age and the resulting frustration might make it harder for the child to stay in contact with his or her implicit motives.

It would be interesting to continue research in this field since the current results raise a lot of questions. For example, do other early childhood factors influence the development of motive congruence, such as attachment styles? Does the need for competence also have an impact on motive congruence? Schüler et al. (2010) found that the implicit achievement motive moderates the relationship between the need for competence and motivational outcomes such as flow experience. This leads to questions about whether specific basic needs are related to specific implicit motives (i.e., competence with achievement and relatedness with affiliation).

Further research should address the above points. This study provides only a first idea about which developmental processes might determine motive congruence. Therefore, further research should assess basic need satisfaction with scales designed to measure this construct and should aim to replicate our findings in new samples. Besides investigating the influence of the family it would be interesting to focus on the impact of school and work environments.

In conclusion, this study is the first to investigate developmental antecedents of motive congruence. Our evidence suggests that experiences of basic need satisfaction in early childhood leads to congruence between implicit and explicit motives later in life.

6. General Discussion

6.1. Summary

This research explores flow experience as consequence and self-determination as antecedents of implicit/explicit motive congruence. Flow experience is a state of optimal motivation in which people get fully absorbed by a smoothly running activity that they pursue for the sake it and without external rewards (Csikszentmihalyi, 1975). According to the compensatory model of motivation and volition (Kehr, 2004b) and in concordance with the classical approach to motivation, the first precondition for flow experience is that, on a proximal level, the incentives provided by the current activity need to arouse one's implicit motives. On a distal level, one's implicit motives, explicit motives, and perceived abilities need to be congruent with each other in order to experience flow. Prior empirical research suggests that motive congruence is associated with enhanced flow experience and that people's perceived incentive strength moderates this relationship (Schüler, 2010). Since motive congruence has been shown to be a precondition for flow experience, one might wonder what leads to motive congruence. Thrash and colleagues (Thrash & Elliot, 2002; Thrash et al., 2007, 2010) argue that self-determination would be the most promising factor that fosters motive congruence.

In this dissertation, we presented three studies to investigate our main research questions. Study 1 explored whether the arousal of the implicit achievement motive through achievement-related incentives leads to enhanced flow experience in indoor wall climbers. In this field experiment, we compared the flow experience of climbers with a high versus low implicit achievement motive on four different routes: (1) an intra-personally easy route, (2) an intra-personally challenging route, (3) an intra-personally hard route, and (4) the same hard route climbed for the second time. Results showed that climbers with a high implicit achievement motive increased their flow experience from the easy (Route 1) to the challenging route (Route 2) in contrast to climbers with a low implicit achievement motive whose flow experience did not increase. From the easy to the challenging route, climbers also perceived an increase in achievement-related incentives. We therefore concluded that achievement-related incentives aroused the implicit achievement motive, which led to the increase in flow experience in climbers with a high implicit achievement motive. We also found a similar pattern from the hard route (Route 3) to the repeated hard route (Route 4). We argued that achievement-related incentives caused the increase in flow experience in climbers with a high implicit achievement motive because doing something better is a natural incentive for someone with a high implicit achievement motive (McClelland, 1987). Unfortunately, we could not demonstrate

that climbers perceived a significant increase in achievement-related incentive from the hard route to the repeated hard route. This is possibly because the routes did not differ objectively. The results support the first precondition of the compensatory model of motivation and volition (Kehr, 2004b) regarding flow experience: Behavioural congruence with the implicit motives fosters flow experience. Since it would have been preferable to include the explicit domain in the analyses, we included it in Study 2.

Study 2 explored whether implicit/explicit achievement motive congruence is associated with flow experience and whether achievement-related incentive strength moderates this relationship. In this field study, we aimed to predict the increase of climbers' flow experience from an intra-personally easy to an intra-personally challenging route with implicit/explicit achievement motive congruence. We expected perceived achievement-related incentives to moderate this relationship. We found the predicted interaction between motive congruence and perceived achievement-related incentives. However, we did not find the expected main effect for motive congruence. Instead, we found an unexpected main effect for the perceived achievement-related incentives. In other words, achievement motive congruence was associated with an increase of flow experience only if climbers perceived strong achievement-related incentives for climbing. The findings replicate Schüler's (2010) results showing that situational cues such as activity-related incentives moderate the impact of motive congruence on flow experience. Besides its impact on flow experience, motive congruence positively affects goal pursuit (i.e., Brunstein et al., 1998), life satisfaction (i.e., Schüler et al., 2008), and health (i.e., Job et al., 2010). Because of the significant role motive congruence plays in determining these outcomes, we aimed to investigate its antecedents.

Study 3 explored whether the experience of self-determination in childhood would predict congruence between implicit and explicit motive later in life. According to Thrash et al. (2007, 2010), self-determination is the most promising moderator of congruence between implicit and explicit motives. Accordingly, these authors questioned whether parents would be able to foster motive congruence by enhancing self-determination. Self-determination results from the satisfaction of the three basic needs for autonomy, relatedness, and competence (Deci & Ryan, 2000). Therefore, we expected that childhood environments which satisfy the needs for autonomy, relatedness, and competence would be positively associated with motive congruence whereas childhood factors that dissatisfy these needs would be negatively associated with motive congruence. In a longitudinal archive study, we explored the impact of mothers' self-reported child rearing patterns when the children were five years old on the children's motive congruence twenty-six years later (Schattke et al., 2010). We found that child rearing patterns that

dissatisfied the need for autonomy (*mother restricts sexuality*, *mother restricts dependency*) and relatedness (*mother separation 9-24 months*, *child dominance*) negatively predicted motive congruence at age 31. These findings support the notion that the factors which foster the development of self-determination also promote motive congruence.

6.2. Interpretations and Practical Implications

Study 1 and Study 2 examined flow experience beyond the demands-skill balance approach and analysed the impact of the autotelic component on flow experience. Csikszentmihalyi (1975) argues that flow experience occurs in autotelic activities but did not systematically examine the autotelic impact of activities on flow experience. We reason that an activity will be autotelic if the incentives in the current activity arouse one's implicit motives as conceptualised in the classical approach to motivation and the compensatory model of motivation and volition (Kehr, 2004b). By manipulating the incentive strength on the different routes, we demonstrated that flow experience increased only in climbers with a high implicit achievement motive on routes that provided stronger achievement-related incentives than the ones before. We conclude that this represents an autotelic component, which is crucial for flow experience. In other words, a situation that arouses one's implicit motives fosters flow experience.

In Study 2, we examined both implicit *and* explicit domains. More precisely, we found that the congruence between the implicit and explicit achievement motives predicted flow experience if climbers perceived the climbing activity as achievement-related. We concluded that strong perceived achievement-related incentives in combination with motive congruence represent the first and second preconditions of the compensatory model of motivation and volition (Kehr, 2004b) that (1) the situation should arouse one's implicit motives and (2) no competing explicit motives should be activated. Moreover, we concluded that the third precondition – (3) people should perceive their abilities as sufficient – was also fulfilled in our studies, since we adjusted the difficulty level intra-personally and also controlled for perceived abilities. Hence, Study 1 and 2 empirically support the three preconditions of the compensatory model of motivation and volition (Kehr, 2004b) regarding flow experience in the achievement domain.

These empirical findings and theoretical considerations have practical implications for everyday life. In order to be motivated in an optimal way, people should try to find out which activities arouse their implicit motives. Rheinberg (2002) and Rheinberg and Engeser (2010) suggest a couple of techniques for retrospective diagnostics of one's implicit motives. For example, people should list activities they pursue repeatedly without

rewards or think about which conditions or incentives an activity needs to provide in order to be joyful, effective, and flow like. For prospective decision-making regarding goal selection, Rheinberg suggests that, instead of focussing on the potential outcomes, one should imagine the performance of all the activities that are necessary to achieve the goal. Schultheiss and Brunstein (1999) originally proposed this imagination technique and demonstrated its effectiveness in a counselling situation and a computer game task. Job and Brandstätter (2009) pointed out that focussing on motive-specific affective incentives when imagining the activity is crucial for the effectiveness of the imagination technique. In other words, it is not enough to imagine the activity per se. It is important to imagine whether the activity arouses an emotion.

Furthermore, Rawolle (2010) has shown that motive-specific visions aroused people's implicit motives which led to enhanced motivation, increased motive-specific hormone release, and better task performance.

Finally, Kehr (2002, 2009) created a self-management training including some techniques outlined above to increase motive congruence. This training has been shown to be effective (Kehr & von Rosenstiel, 2006). Consequently, this training should translate into more frequent episodes of flow experience because people who are aware of their implicit motives should engage more often in situations that fit their implicit motives (Rheinberg, 2002).

Our review of the literature indicated that, interestingly, few studies have looked at the antecedents of motive congruence. Study 3 was a first attempt to examine the developmental correlates of motive congruence and to follow up on Thrash et al.'s (2007, 2010) assumption that self-determination promotes motive congruence and that parents should be able to foster motive congruence by enhancing self-determination. Self-determination results from the satisfaction of the basic needs for autonomy, relatedness, and competence. Indeed, the present research shows that early childhood experiences of autonomy and relatedness lead to stronger motive congruence in adulthood. Unfortunately, our archival data set did not include any proxy variables for competence. Hence, we could not test for early childhood experiences of competence for which we assume the same mechanism. The dissatisfaction of these basic needs inhibit children to follow their affective impulses. Consequently, children will follow their mothers' expectations rather than their own needs. One could assume that children will then attempt to internalise social norms and values, which are not attuned to the needs of the self, that is, their explicit motives will not be in line with their implicit motives. According to SDT, this would lead to a regulation of behaviour that is based on compliance, self-control, or ego-involvement (Ryan & Deci, 2000).

In this sense, SDT provides a theoretical framework to explain the process of integration, the type of internalisation which leads to the development of motive congruence. Our study has contributed to the literature by providing the first evidence for the role of autonomy and relatedness satisfaction in the development of motive congruence. Future research should include measures of internalisation, as described in the Organismic Integration Theory – a sub-theory of SDT (Ryan & Deci, 2000), in order to verify whether this process mediates the relation of need satisfaction to motive congruence.

Our empirical findings and theoretical considerations have practical implications for childrearing, education, but also for school and work environments (i.e., Gagné & Deci, 2005). Situations which satisfy the basic psychological needs of autonomy, competence, and relatedness should help to internalise social values and norms that are in line with one's implicit motives and in turn enhance motive congruence. For example, managers' autonomy-support in the workplace and employees' basic need satisfaction leads to organisational commitment (Gagné, Koestner, & Zuckerman, 2000), job satisfaction (Ilardi, Leone, Kasser, & Ryan, 1993), and better job performance (Baard, Deci, & Ryan, 2004). Furthermore, students perform better when teachers show autonomy-supportive behaviour at school (deCharms, 1976; Deci, Spiegel, Ryan, Koestner, & Kauffman, 1982) by acknowledging the students' perspectives, encouraging their initiative, and avoiding controlling language (Deci & Ryan, 2000).

Taken together, this dissertation connects research on flow experience as consequence of person-situation fit and motive congruence with self-determination as antecedents of motive congruence. The present research tested basic assumptions of the compensatory model of motivation and volition (Kehr, 2004b) and the idea that self-determination affects the congruence between implicit and explicit motives.

6.3. Limitations and Future Research

The present research has some limitations. Most of them have been already discussed in the discussion chapters of the respective studies (Chapters 3.3, 4.3, 5.3) such as the small sample sizes and the order of the routes in Study 1 and 2 and that we re-analysed an old sample using proxy variables to measure basic need satisfaction in Study 3. However, we will discuss some more general issues here.

First, we did not demonstrate the entire underlying processes which we assumed to cause our effects. For example, in Study 1, we assumed that the arousal of the implicit motive led to affective preferences toward the activity and that the congruence of affective preferences, cognitive preferences, and subjective abilities led to flow

experience. However, we did not measure the affective and cognitive preferences. The same is true for Study 2. When looking at the personal component in the classical approach to motivation, we remained on the distal level, namely the implicit and explicit motives. It would be desirable to also measure the mediating processes of affective preferences, cognitive preferences, and subjective abilities on the proximal level in order to demonstrate the whole model and test the underlying processes. For example, Schiepe-Tiska et al. (2011) demonstrated that affective preferences mediate the relationship between implicit motives and flow experience for using innovation software.

To test the whole compensatory model of motivation and volition (Kehr, 2004b), it would also be important to manipulate the explicit component. In Study 1, we manipulated the activity-related incentives to arouse the implicit achievement motive using an aptitude-treatment design. In Study 2, however, we incorporated the explicit achievement motive included in the motive congruence variable. It would be preferable to use an analogue design to examine the impact of the explicit achievement motive while holding the implicit motive and the perceived abilities constant. Other studies have used such an approach but did not measure flow experience (i.e., Brunstein & Hoyer, 2002; Brunstein & Maier, 2005; Koestner et al., 1991). Future research should aim to use this analogue design as well as measure flow experience.

Moreover, in Study 3, we assumed that the internalisation of social values which did not fit people's implicit motives would be responsible for motive congruence. However, we did not provide direct empirical evidence for this process in the present research. We showed that dissatisfaction of basic needs negatively predicted motive congruence. Further research should aim to measure internalisation in order to examine the mechanism by which motive congruence is assumed to develop.

Second, we focussed on the achievement domain in Study 1 and 2 but looked at a globalised measure of motive congruence across all three motives in Study 3. It would be interesting to look at differential effects for the three different motives. On the one hand, one could test whether the congruence of the power and affiliation motive also leads to flow experience as conceptualised by the compensatory model of motivation and volition (Kehr, 2004b; Schattke & Kehr, 2009; Schiepe-Tiska & Engeser, in press) or whether flow experience is restricted to achievement situations as implied by Csikszentmihalyi (1975, 1990). On the other hand, it would be interesting to check for differential effects of the different basic psychological needs with the different implicit motives. For example, Schüler et al., (2010) found that the implicit achievement motive moderated the relationship between the satisfaction of the need for competence and different motivational outcomes including flow experience.

Third, Baumann and Scheffer (2010a, 2010b) proposed a flow motive. These authors conceptualised the flow motive as the intrinsic component of the achievement motive measured with the Operant-Motive-Test (OMT, Kuhl & Scheffer, 1999; Kuhl et al., 2003). According to the OMT, "the intrinsic component of the achievement motive is characterized by mastery- and approach-oriented strivings to meet internal standards of excellence" (Baumann & Scheffer, 2010a, p. 3). Baumann and Scheffer (2010a) show that the achievement flow motive is stable over time and predicts flow experience in different situations but also self-determination, and work-efficiency. They propose using the flow motive to conceptualise the autotelic personality. The flow motive, as conceptualised by Baumann and Scheffer (2010a, 2010b), is restricted to the achievement domain due to the type of measurement. However, other theoretical considerations suggest flow in the affiliation and power domains (Kehr, 2004b; Schattke & Kehr, 2009; Schiepe-Tiska & Engeser, in press). Thus, further research should gather more empirical evidence and extend the theoretical considerations concerning the flow motive and different motivational domains in which flow is expected to occur.

Fourth, we used a self-report measure of flow experience. Even though we measured flow as close to the activity as possible, we had to interrupt the experience of flow in order to measure it. In Study 2, we could show that the flow assessment during climbing the route did not differ from the assessment that was made after climbing the route. Nevertheless, it would be preferable to have additional measures of flow experience with more objective indicators such as facial expressions, distractibility from the task, or discrepancy between time estimates and the actual time passed. In this regard, it would also be interesting to look at concordance between the different measures.

6.4. Conclusions

In conclusion, the aim of this dissertation was to highlight the relevance of motive congruence as a core aspect for motivation. First, we demonstrated on a proximal level that a motive-person fit leads to increased flow experience in indoor wall climbers. Second, we demonstrated on a distal level that motive congruence, which is thought to help people to engage more often in activities that fit their motive structure, is related to flow experience. This relationship was moderated by perceived activity-related incentives, which highlights the importance of person-situation interactions. Third, we demonstrated that experiences of self-determination in childhood foster motive congruence later in life.

The present research suggests that raising children in a way that promotes self-determination supports the development of motive congruence, which will help them to engage in activities that arouse their implicit motives and which will therefore enhance flow experience, the state of optimal motivation. If we manage to experience flow frequently, we might be able to achieve more happiness in our lives (Csikszentmihalyi, 1999).

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8. Appendix

This Article (Schattke et al., 2010) has been published as an advance online publication and is about to appear as a printed version in a special issue about Implicit Motives in *Motivation and Emotion*.

Schattke, K., Koestner, R., & Kehr, H. M. (2010). Childhood correlates of adult levels of incongruence between implicit and explicit motives. *Motivation and Emotion*, Advance online publication. doi:10.1007/s11031-010-9182-9

9. Erklärung

Ich erkläre an Eides statt, dass ich die der **Fakultät für Wirtschaftswissenschaften** der Technischen Universität München zur Promotionsprüfung vorgelegte Arbeit mit dem Titel

Flow Experience as Consequence and Self-Determination as Antecedent of Congruence between Implicit and Explicit Motives

am **Lehrstuhl für Psychologie** unter der Anleitung und Betreuung durch **Prof. Dr. Hugo M. Kehr** ohne sonstige Hilfe erstellt und bei der Abfassung nur die gemäß § 6 Abs. 5 angegebenen Hilfsmittel benutzt habe.

Ich habe die Dissertation in keinem anderen Prüfungsverfahren als Prüfungsleistung vorgelegt.

Ich habe den angestrebten Doktorgrad noch nicht erworben und bin nicht in einem früheren Promotionsverfahren für den angestrebten Doktorgrad endgültig gescheitert.

Die Promotionsordnung der Technischen Universität München ist mir bekannt.

München, den 31.05.2011 Kaspar Schattke