

**Passion as concept of the psychology of motivation**

*Conceptualization, assessment, inter-individual variability and long-term stability*

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### **“On Reason and Passion**

Your soul is oftentimes a battlefield, upon which your reason and your judgment wage war against your passion and your appetite.

Would that I could be the peacemaker in your soul, that I might turn the discord and the rivalry of your elements into oneness and melody.

But how shall I, unless you yourselves be also the peacemakers, nay, the lovers of all your elements?

Your reason and your passion are the rudder and the sails of your seafaring soul. If either your sails or your rudder be broken, you can but toss and drift, or else be held at a standstill in mid-seas.

For reason, ruling alone, is a force confining; and passion, unattended, is a flame that burns to its own destruction.

Therefore let your soul exalt your reason to the height of passion, that it may sing;

And let it direct your passion with reason, that your passion may live through its own daily resurrection, and like the phoenix rise above its own ashes.

I would have you consider your judgment and your appetite even as you would two loved guests in your house.

Surely you would not honour one guest above the other; for he who is more mindful of one loses the love and the faith of both.

Among the hills, when you sit in the cool shade of the white poplars, sharing the peace and serenity of distant fields and meadows - then let your heart say in silence, "God rests in reason."

And when the storm comes, and the mighty wind shakes the forest, and thunder and lightning proclaim the majesty of the sky -- then let your heart say in awe, "God moves in passion."

And since you are a breath in God's sphere, and a leaf in God's forest, you too should rest in reason and move in passion."

(Kahlil Gibran, 1923 / 2002)

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## Summary

This thesis focuses on the psychological construct of passion for activities, particularly on the conceptualization, measurement, stability and inter-individual variability of passion.

A first paper reviews the literature about passion and related constructs and suggests a new definition of passion as an individual's coinciding desire and commitment towards an activity. The second paper of this thesis suggests a scale for the assessment of desire, commitment, and further more specific components of passion. This paper reports the psychometric properties, reliability and validity of the new scale, and tests central assumptions of the definition proposed in the first paper. The third paper investigated the relation of passion to specific facets of personality, particularly the sensitivity to reward and positive trait affectivity. Finally, the fourth paper investigated the stability of passion among adolescents across a period of two years, and disentangles the extents to which situation-specific and person-specific influences account for the observed variance in passion.

The main findings of this thesis are:

1. Most psychological definitions of passion coincide in defining passion as a multifaceted construct that describes an individuals' coinciding experience of desire and commitment towards an activity, including the feeling of strong approach motivation, high arousal affect, continuous action plans pertaining to the activity, identification with the activity, and long-term goals referring to the activity.
2. Commitment is a central component of passion. The conducted studies support the definition of passion as coincidence of commitment and desire for activities.
3. The newly developed com.pass scale is a valid and reliable measure for the assessment of commitment, desire, and further specific components of passion.
4. Individuals differ in the degree to which they report feeling passionate about a particular activity. In a number of samples, two homogeneous groups of 1) highly passionate individuals and 2) lowly passionate individuals were found.

5. In contrast, the dual model of passion from Vallerand et al. (2003) was not supported in the studies of this thesis. There were strong correlations between the subscales of harmonious and obsessive passion. There were no homogeneous groups of either harmonious or obsessive individuals. Instead, the individuals' scores for these subscales of the dual model passion scale were either both high or both low.
6. Passion is positively correlated with affect- and reward-related personality traits, particularly with the sensitivity to reward and positive trait affectivity.
7. The likelihood of a person to experience many or few passionate situations (meaning the coincidence of commitment and desire) remains stable across a period of two years during adolescence both in terms of mean-level and rank-order stability.
8. Differences between everyday life activities account for 80% of the variance in momentary passion (meaning the coincidental experience of commitment and desire in a given situation). About 20% of the variance in passion are due to relatively stable inter-individual differences.

This thesis contributes to the psychology of motivation an integration of previously separated research lines, definitions and measurements and new insights regarding situational and person-specific determinants for long-term commitment and affect-intense approach motivation towards activities.

## **Zusammenfassung**

Diese Dissertation handelt von dem psychologischen Konstrukt Leidenschaft für Aktivitäten, und beschäftigt sich insbesondere mit der Konzeptualisierung, Messung, Stabilität und inter-individuellen Variabilität von Leidenschaft. Die Arbeit wurde nach Absprache mit dem Betreuer Professor Dr. Ernst A. Hany als kumulative Dissertation in englischer Sprache verfasst. Das bedeutet, statt einer Monographie handelt es sich bei dieser Arbeit um eine Darlegung vier einzelner Zeitschriftenartikel, die durch eine Allgemeine Einleitung und eine allgemeine Diskussion ergänzt und verbunden werden.

Der erste Artikel fasst theoretisch die Literatur zum psychologischen Konstrukt Leidenschaft zusammen und schlägt als Schlussfolgerung aus dieser Literaturschau eine neue Definition von Leidenschaft vor. Darin wird Leidenschaft definiert als das Zusammentreffen von affektintensiver Annäherungsmotivation („Desire“) hinsichtlich einer Aktivität bzw. Domäne und Bindung an eine Aktivität bzw. Domäne („Commitment“).

Der zweite Artikel schlägt eine Skala für die Messung dieser und weiterer spezifischer Leidenschaftskomponenten vor. Dieser Artikel berichtet messtechnische Eigenschaften der Items, sowie Reliabilität und Variabilität der Skala und testet zentrale Annahmen der im ersten Artikel vorgeschlagenen Definition von Leidenschaft.

Der dritte Artikel untersucht Zusammenhänge zwischen Leidenschaft und spezifischen Persönlichkeitsfacetten, insbesondere den Merkmalen Belohnungssensitivität und dispositionaler positiver Affektivität.

Der vierte Artikel untersucht die Stabilität von Leidenschaft über einen Zeitraum von zwei Jahren in einer Stichprobe U.S.-amerikanischer Jugendlicher mit Hilfe eines längsschnittlichen Experience Sampling Method Ansatzes. Zudem berichtet dieser Artikel, in welchem Maße das momentane Erleben von Leidenschaft in bestimmten Situationen durch situationsspezifische und personenspezifische Merkmale erklärt wird.

Die Hauptbefunde dieser Dissertation lauten:

1. Die meisten psychologischen Definitionen von Leidenschaft stimmen darin überein, dass sie Leidenschaft als facettenreiches Konstrukt definieren, welches das gleichzeitige Erleben von affektintensiver Annäherungsmotivation („Desire“) und Bindung an eine Aktivität („Commitment“) beschreibt und durch die folgenden weiteren Merkmale charakterisiert wird: kontinuierliche Handlungspläne in Bezug auf die Aktivität, Identifizierung mit der Aktivität, und Verfolgung langfristiger Ziele in Bezug auf diese Aktivität.
2. Das Konstrukt Commitment bildet eine zentrale Komponente von Leidenschaft. Die im Rahmen dieser Dissertation durchgeführten Studien stützen die Definition von Leidenschaft als Zusammentreffen von Commitment und affektintensiver Annäherungsmotivation.
3. Die neuentwickelte Com.pass-Skala ist ein reliable und valides Instrument zur Messung von Commitment, affektintensiver Annäherungsmotivation, und weiterer spezifischer Komponenten von Leidenschaft.
4. Individuen unterscheiden sich hinsichtlich des Ausmaßes, in dem sie berichten, Leidenschaft für bestimmte Aktivitäten zu empfinden. In mehreren Studien dieser Dissertation fanden sich jeweils zwei homogene Gruppen, erstens eine Gruppe hoch leidenschaftlicher Personen, und zweitens eine Gruppe wenig leidenschaftlicher Personen.
5. Dagegen werden zentrale Annahmen des Dualen Leidenschaftsmodells von Vallerand und Kollegen (2003) durch die Ergebnisse der Studien dieser Dissertation in Frage gestellt. So waren die Subskalen der beiden Leidenschaftstypen harmonische und obsessive Leidenschaft stark miteinander korreliert, und es fanden sich keine Gruppen vorwiegend harmonisch leidenschaftlicher bzw. vorwiegend obsessiv leidenschaftlicher Personen. Anders als von Vallerand und Kollegen angenommen

weisen die meisten Personen gleichermaßen hohe bzw. niedrige Werte in beiden Leidenschaftstypen auf.

6. Leidenschaft ist positiv korreliert mit affekt- und belohnungsbezogenen Persönlichkeitseigenschaften, vor allem den Merkmalen Belohnungssensitivität und dispositionaler positiver Affektivität.
7. Der Anteil von leidenschaftlich erlebten Situationen (operationalisiert als gleichzeitiges Erleben von affektintensiver Annäherungsmotivation und Commitment in einer Situation) an allen Alltagssituationen bleibt recht stabil über einen Zeitraum von zwei Jahren, und zwar sowohl hinsichtlich der Rangreihenstabilität als auch hinsichtlich der Stabilität des personenübergreifenden Mittelwerts.
8. Unterschiede zwischen Alltagssituationen erklären 80% der Varianz im Auftreten von „momentanem leidenschaftlichen Erleben“ (operationalisiert als gleichzeitiges Erleben von affektintensiver Annäherungsmotivation und Commitment in einer Situation). Dementsprechend werden etwa 20% der Varianz durch Unterschiede zwischen Personen erklärt.

Diese Dissertation bereichert die Leidenschaftsforschung durch um eine neue Definition und Skala sowie neue Einsichten zu personenspezifischen und situationsspezifischen Korrelate langfristigen Commitments und affektintensiver Annäherungsmotivation. Darüber hinaus ist es ein wichtiges Anliegen dieser Arbeit, bisher disparate Forschungslinien miteinander zu integrieren, beispielsweise die Gemeinsamkeiten der disparaten aber ähnlichen Forschungsarbeiten zum psychologischen Konstrukt der Leidenschaft zu integrieren, als auch die bisher getrennten Forschungen zu den Konstrukten Leidenschaft und Commitment miteinander zu verbinden, sodass die Einsichten einer Forschungsrichtung für die jeweilig andere nutzbar werden.

# **Part I. General Introduction**

## **Introduction**

Passion has fascinated researchers of different disciplines for centuries. The discipline of psychology has an ambivalent relation to passion. When psychology emancipated as a distinct discipline from its theological and philosophical origins, the concept of passion was replaced by the more secular and scientific concept of emotions (Dixon, 2003). However, attempts to reestablish passion as a psychological construct are old (see Gardiner, 1907), and during the last decade the concept passion has had a renaissance in the discipline of psychology. By now, passion has become a frequent buzzword in conference talks, publications in for example motivational psychology (Fredricks, Alfeld, & Eccles, 2010) and gifted education (Winner, 2007), and even the International Conference on Motivation (ICM) in 2014 will be themed “Understanding and Facilitating the Passion to Learn”. However, not only the acceptance of the term has changed but also its connotation. Today, passion is often regarded as desired experience and assumed to be what “makes life worth living’ (Marsh et al., 2013; Vallerand et al., 2003, p. 757; Vallerand, 2008), whereas from its origins through centuries passion was regarded as something ruinous, immoral, unreasonable and painful (see Dixon, 2003), so that still at the beginning of enlightenment, the German philosopher Immanuel Kant claimed “no human being wishes to have passion. For who wants himself put in chains when he can be free?” (Kant, 2006/1798, p. 151). This ambivalence of desired and ruinous aspects of passion has been picked up by the recent research on passion as psychological construct (Vallerand et al., 2003), which is summarized in the following.

### **The Previous Research about Passion**

#### **Passion Concepts and Findings in the Previous Research**

The previous research is dominated by the works from Robert Vallerand and colleagues, who had initiated the renaissance of passion as a construct of psychology when

they introduced their ‘dual model of passion’ and the corresponding passion scale in 2003.

This model, which distinguishes between the adaptive harmonious passion and the maladaptive obsessive passion, has motivated many empirical studies on the nature, predictors, correlates, and outcomes of the two types of passion. The dominating topic of the previous research on passion regards differences between harmonious and obsessive passion and / or the psychometric quality of the corresponding passion scale (e.g. Marsh et al., 2013). Most of the studies find that harmonious passion is positively correlated with intrinsic and/or adaptive experiences and behaviors, such as flow (Philippe, Vallerand, Andrianarisoa, & Brunel, 2009; Vallerand, et al., 2003; Carpentier, Mageau, & Vallerand, 2012), psychological and physical well-being (Vallerand 2012; Vallerand et al., 2006), mastery goal orientation and deliberate practice (Bonneville-Roussy, Lavigne, & Vallerand, 2011), positive affect during and after activity engagement (Philippe, Vallerand, Houliort, Lavigne, & Donahue, 2010), and maintenance of control over the activity (Vallerand, et al., 2003; Mageau, Vallerand, Rousseau, Ratelle, & Provencher, 2005). In contrast, obsessive passion is correlated with maladaptive and undesirable experiences such as loss of control and symptoms of dependency (Ratelle, Vallerand, Mageau, Rousseau, & Provencher, 2004; Philippe & Vallerand, 2007), negative affect during activity engagement and when the individual is prevented from doing the activity (Philippe, Vallerand, Andrianarisoa et al., 2009; Vallerand et al., 2003), sport injuries (Rip, Fortin, & Vallerand, 2006), ruminative thoughts about the activity (Carpentier et al., 2012), aggression under identity threat (Rip, Vallerand, & Lafrenière, 2012), impaired concentration (Ratelle et al., 2004), problematic persistence (Vallerand et al., 2003), performance goal orientation (Bonneville-Roussy et al. 2011), and relationship conflicts (Séguin-Lévesque, Laliberté, Pelletier, Vallerand, & Blanchard, 2003).

In addition to the well explored dual model of passion, there are other definitions and measures of passion in the previous literature (for a review see Moeller, Eccles, et al., in



prep.). There is for example the domain-specific concept of entrepreneurial passion (Cardon, Wincent, Singh, & Drnovsek, 2009), which is the result of a thorough review of passion definitions in the literature about entrepreneurship. In this review, Cardon and colleagues identified research gaps of the previous literature, which are important also for the research on passion in other domains, namely the questions: 1) how (entrepreneurial) passion can be defined clearly and theoretically based, 2) whether (entrepreneurial) passion could be understood as a personality trait or rather an activity- or situation-specific experience, and 3) which conceptual model could explain the influence of (entrepreneurial) passion on the relevant outcomes. Furthermore, other research approaches are the definition of general passion as intrinsic experience of self-relevant, absorbing and desired activities (Fredricks et al., 2010), the similar definition of passion as a ‘romance with a topic or discipline’ (Renzulli, Köhler, & Fogarty, 2006), the different concept of passion as short-term sexual attraction towards another person (Sternberg, 1986). Moreover, there is a number of implicit passion definitions, most of which related passion to strong and stable interests or to urging and persistent motivation in learning and achievement contexts (e.g. Achter & Lubinski, 2005; Amabile & Fisher, 2009; Csikszentmihalyi, 1996; Delcourt, 2003; Gagné, 2007; Hébert & McBee, 2007; Mills, 2003, Winner, 2007).

### **Blind Spots in the Previous Research**

The diversity of passion definitions and measures in the previous research has led to inconsistencies and terminological ambiguities, because the differences between the approaches have led to the situation that nobody knows exactly what is meant when a psychological researcher to date talks about passion. The research gaps that Cardon, Wincent et al. (2009) found in the literature on entrepreneurial passion (see above) are also important but understudied in the general literature about passion. There is no integration of the dispersed definitions of passions, and therefore no consensus about the question how passion can be

defined clearly and theoretically based. This lack of integration concerns not only the definitions but also the measures of passion, of which there are various incongruent methods (compare Vallerand et al., 2003 with Fredricks et al., 2010 and Cardon, 2008).

Additional to the ambiguities due to inconsistent definitions of passion, there are ambiguities because of overlaps of passion with other constructs of the motivational psychology. For example, Fredricks et al. (2010) have discussed the specific components in which passion overlaps with the constructs well-developed individual interest (Hidi & Renninger, 2006), intrinsic motivation (in terms of Deci & Ryan, 1985), flow (Csikszentmihalyi, 1996), mastery goal orientation (Dweck & Leggett, 1988), rage to master (Winner, 1996; 2000), and attainment value (Wigfield & Eccles, 1992). Despite this first attempt to clarify the relation of passion to overlapping constructs, there is still a lack of theoretical discussions and empirical studies pertaining to the uniqueness of passion in comparison to other constructs.

Moreover, some assumptions concerning the nature of passion are often stated but rarely or never investigated. For example, it has been stated that passion remains stable across long time spans (e.g. Amiot, Vallerand, & Blanchart, 2006). This assumption, however, has not been tested in adequate long-term longitudinal studies.

Furthermore, it has been assumed that passion was influenced by personality traits or could even be conceptualized as a stable disposition (Cardon, Wincent, et al., 2009; Duckworth, Peterson, Matthews, & Kelly, 2007), but the empirical findings on relations between passion and personality traits are inconsistent and remained on the level of abstract personality factors (Balon, Lecoq & Rimé, 2013; Tosun & Lajunen, 2009; Wang & Yang, 2007).

Another often stated but rarely tested assumption claims that individuals differ in their type of passion (Vallerand et al., 2003). Despite the frequent claim that harmoniously passionate individuals function differently than obsessively passionate individuals (Vallerand

et al., 2003), most studies address not the difference between individuals but rather the different functioning of the two scales for harmonious and obsessive passion, which is not an adequate way to study inter-individual differences. A few studies have categorized the investigated individuals as being either harmoniously or obsessively passionate by grouping them according to the highest standardized score at the subscales for harmonious and obsessive passion (Philippe, Vallerand, & Lavigne, 2009; Mageau et al., 2009). However, the question whether such groups of more harmoniously or more obsessively passionate individuals can be empirically found in the studied samples has rarely been investigated with adequate person-oriented analyses. To the knowledge of the author, only one study investigated this question with a cluster analysis, and found surprisingly that there were three clusters of 1) high, 2) moderate, and 3) low passion scores, but that individuals of the high passion cluster had high values in both harmonious and obsessive passion, whereas individuals in the low passion cluster had low values in both subscales, respectively (Wang, Khoo, Liu, & Divaharan, 2008).

### **Research Questions and Research Program of This Thesis**

The present research started with the observation that there was neither a consensual definition, nor measure of passion, that the relation of passion to other constructs was unclear, and that some of the basic assumptions concerning the nature of passion were only stated but not empirically tested. The lack of research about these basic questions was in contrast with the rapidly growing number of studies on the predictors, correlates, and outcomes of harmonious and obsessive passion. In order to contribute something that was not already done by other researchers, this thesis is dedicated to the clarification of the above mentioned basic questions.

The research program that guided the works of this thesis comprised of three main goals:

- 1) to develop a model of passion that should...
  - a. be theory-based and well embedded in the previous research on passion
  - b. integrate the commonalities of the diverse psychological passion definitions within one concept
  - c. describe the specific components of passion
  - d. and should help to overcome the previously existing terminological ambiguities pertaining to the relation of passion to other similar constructs
- 2) to develop a measurement instrument of passion that should...
  - a. be suited to assess passion and its specific components according to the previously developed definition (see above goal one)
  - b. be a reliable and valid measure of the general degree of passion beyond the distinction between specific types of passion
- 3) to test empirically the assumptions of the passion research that concern central aspects of the concept, and that are often stated but not tested conclusively in previous studies:
  - a. the long-term stability of passion
  - b. the involvement of personality traits in the experience of passion
  - c. the assumed dichotomy between harmonious and obsessive individuals

The principle goal of this thesis is to align the research about passion in a way that allows more researchers to build upon the works of each other and to enhance the generalizability of the research findings concerning the construct passion. The first task of this dissertation project was therefore to foster the unity and dialogue among motivation researchers and to elaborate an integrative model of passion that should synthesize the commonalities of psychological passion concepts and similar constructs without aggravating the inflation of passion concepts. Particularly the need for a new construct which was reflected in the implicit use of the term passion, and the explicit empirical research on passion

needed conciliation. This motivated the review article, which forms the first part of this dissertation.

The second task of this dissertation was to find or develop an appropriate measure for passion. Several different passion measures had been suggested (Cardon, Wincent et al., 2009; Fredricks et al., 2010; Sternberg, 1997; Vallerand et al., 2003), each of them corresponding to a different concept of passion. As in the theoretical step before, an integration of the similarities of these diverse approaches was needed. Another aim was to provide a measure which could disentangle specific components of passion as well as similarities and differences of passion with other constructs of motivation psychology. For these purposes, a new measure was created and compared to other measures of passion in the second article of this thesis (Moeller & Grassinger, in prep.).

In the third step, empirical studies on basic assumptions of the passion research were conducted. The following studies addressed crucial assumptions of theories about passion that had been stated but not or not sufficiently empirically investigated before. The first of these central assumptions was the long-term stability of passion, which is often presupposed but which remained speculative due to the lack of long-term longitudinal studies. The second of these central assumptions, which is closely related with the assumed long-term stability, is the presumption that passion is partially determined by fixed and differential personality traits (Balon et al., 2013, Tosun & Lajunen, 2009). This is often claimed but had been investigated only in few empirical studies and only on the level of abstract personality factors, not on the more specific and insightful level of personality facets. These questions were investigated in the third and fourth article of this dissertation (Moeller, Dietrich, Eccles, & Schneider, in prep.; Moeller, Keiner, & Wächter, in prep.).

A number of further questions only arose during the research process. One of them was the query whether the type of passion (harmonious versus obsessive, see Vallerand et al., 2003) was indeed the aspect of passion that accounted for most differences between

individuals and outcomes, or if rather the degree of passion (high versus low) was the more important measure for the distinction between individuals. This question was addressed in the second and third article.

### **Methodological Approaches in This Thesis**

The research questions were investigated with different approaches, including a literature review, several cross-sectional self-report questionnaire studies, variable-oriented and person-oriented analyses (see Bergmann & Magnusson, 1997 for the distinction between variable-oriented and person-oriented analyses, and secondary data analysis of a longitudinal experience sampling method study.

Following a classical deductive approach, this thesis begins with a thorough literature review in order to summarize the theory, and to identify relevant research questions. This review compares the different psychological passion definitions, discusses the conceptual overlaps between the constructs passion and commitment, proposes an integrative definition of passion as coincidence of commitment and approach motivation intensity, and discusses which phenomena passion might help to explain.

The second paper suggests a new scale for the assessment of passion corresponding to the definition suggested in the previous review article. The paper described the scale development and reports results concerning the psychometric properties of the scale which were investigated in four cross-sectional studies with altogether 1083 participants. The studies investigated the reliability and validity of the scale among students in schools and universities and among adolescent soccer players.

The third paper also applies a cross-sectional self-report questionnaire approach to investigate the relation of different passion measures to facets of personality and to aspects of dependency in five studies with altogether 806 participants (some of which also participated in the studies of the second paper).

The fourth paper investigated the long-term stability of passion in a longitudinal experience sampling approach. The data of this study were part of the Alfred P. Sloan Study of Youth and Social Development (Schneider, 1992-1997; Csikszentmihalyi & Schneider, 2000). The author got the opportunity to use the data for secondary data analysis. For this paper the author used experience sampling data of 490 U.S. American students of the 6<sup>th</sup>, 8<sup>th</sup> and 10<sup>th</sup> grade, which were assessed in two waves of data collection with a time lag of two years between these waves. The data were analyzed with multilevel modeling.

Some research questions were investigated more than one paper. For example, as a matter of validity, the manifest and latent correlations between the newly developed com.pass scale with the previously established dual model passion scale from Vallerand et al. (2003) were studied in the papers two and three. Furthermore, the second, third, and fourth paper investigated with different methods the question whether there are individuals who are more passionate than others, and to what extent activity-specific and person-specific activities account for differences in the experience of passion.

### **Outline for the Following Chapters**

Part II of this thesis contains the four papers, namely the literature review and three empirical approaches. Part III integrates the research findings of the literature review and all empirical studies and discusses their relevance with respect to the above described research questions. Finally, the open remaining research questions are summarized and directions for the future research are suggested.

This thesis was written in a publication-based format, meaning as consisting of distinct papers rather than as contiguous monograph. However, given that this format is relatively new in the German psychological field, and given that the review process for this thesis will follow the traditional procedures as applied to monographs, the texts had to satisfy mixed exigencies. The second and third paper are therefore longer than they will be when

being submitted to psychological journals. They contain important background information that would be expected in a ‘traditional monograph’ but that will be left out or shifted to the online appendix in journal articles, such as e.g. details about psychometric properties of all the used scales, complete correlation matrices, item wordings, etc.



# **Part II. Review of Theory and Empirical Studies**

**Paper 1: Moeller, J. & Grassinger, R. (2013). A Review of Passion Concepts and their Overlaps with Commitment: Opening a Can of Worms. Paper submitted for publication.**

**Abstract**

This article reviews concepts and models of passion in psychology. These are compared and the related problems such as terminological ambiguities and the lack of evidence for the construct's incremental validity are depicted.

The article then discusses whether there is a missing link in the motivation literature that could and should be filled by the concept of passion. We conclude that passion might be a useful concept for the understanding of persistence despite obstacles and aversive experiences in learning activities such as deliberate practice. Given that established concepts of commitment explain the same phenomenon and are very similar to several concepts of passion. Integrating similarities of central definitions of passion and commitment within a joined framework, we propose a new definition of passion, the 'commitment and passion (com.pass) model', stating that passion can be conceptualized as the coincidence of commitment and high arousal approach motivation. We argue that this new definition of passion is a remedy to current terminological ambiguities in the literature and that the integration of disperse passion and commitment concepts promises to be useful for the understanding of desire and persistence in the face of obstacles.

*Keywords:* Passion, commitment, deliberate practice, com.pass model.

### **Introduction**

The term passion has been used as a word in everyday language in different cultures and languages, in different disciplines, during different centuries and with different connotations in each one of these cases (see Dixon, 2003, for a historical review). Today, passion is a frequent term in many disciplines and areas of everyday life, particularly advertisement. In psychology and education, too, passion is a frequently used, opalescent but opaque term in many publications, particularly in articles on gifted education issues. Therein, passion is handled as a new construct of motivational psychology (Fredricks, et al., 2010; Vallerand, et al., 2003). As a scientific construct, passion should be clearly and consensually defined, validly measured, and it should explain relevant phenomena which are not yet explained by previously existing constructs. This article discusses to what extent these requirements are met by hitherto existing research approaches to passion, which are reviewed in the first section. The second section of this article discusses problems related to the current psychological passion definitions, such as existing terminological ambiguities and a lack of evidence for incremental validity in the current conceptions of passion. The third section discusses whether there is a gap in the current literature that requires a new construct like passion. We conclude that passion is a motivational concept that may explain persistence despite obstacles and aversive experiences, which is typical for example in deliberate practice. The fourth section discusses the contribution of passion and similar motivational constructs (e.g. commitment) to the explanation of this phenomenon. In order to overcome terminological ambiguities, we then integrate different existing passion and commitment concepts within one theoretical framework. The fifth section presents a conclusion and directions for future research.

### **Herding Worms: Concepts of Passion in the Current Literature**

In the following we give a short overview about the development of passion concepts across disciplines and time, and about implicit and explicit passion concepts within the psychological discipline.

#### Passion Concepts across Centuries and Disciplines

Passion has not always been considered a presumable explanation for achievement and success, as it is today. On the contrary, for centuries, passion was regarded as something ruinous (see e.g. Kant 2006/ 1798; Kant, Zöller, & Louden, 2007). The term passion has been used – and changed – throughout centuries and various disciplines, but a common connotation of traditional and contemporary passion concepts is the implication of intense affects and desires. The historical concept of passion as an umbrella term for emotional phenomena still lives on in psychological texts (Dixon, 2003; Frijda, 1986; 2007; Solomon, 1993; Stoellger, 2010; Thomaes, Bushman, de Castro, & Reijntjes, 2012). As Dixon (2003) points out, there were good reasons for replacing the theological concept of passion by the more scientific concept of emotion. Nevertheless, attempts to re-establish passion as a psychological construct are old (see Gardiner, 1907). Currently, the term passion is still a widely studied term within different disciplines including history (Dixon, 2003; Paster, Rowe, & Floyd-Wilson, 2004), philosophy (Bodei, 1991; Solomon, 1993), gender studies (Moore, 1994; Peletz, 1996), sociology (Illouz, 1991; Luhmann, 1982), and economy (e.g. Cardon, Wincent, et al., 2009; Chen, Yao, & Kotha, 2009; Klaukien & Breugst, 2009; Whang, Allen, Sahoury, & Zhang, 2004). In summary, passion was traditionally connoted with suffering, loss of control, immoral desires, and ruinous consequences. The connotation has changed and become much more positive, beneficial and desirable.

### Current Implicit Passion Concepts in Psychology

In the current psychological literature, the term passion is used frequently, but inconsistently across research articles. In many publications the term is used without being defined, operationalized or empirically investigated further on (see below). Typically, these research articles postulate assumptions about links between passion and other constructs, but do not refer to any specific passion concept. However, in most of these cases, the connotation of passion can be inferred from the context. These connotations of implicit passion concepts are described in the following.

*Passion as a strong interest:* For Gagné, passion is no independent phenomenon but just an extreme of interest. He claims that passion stands „at the top end of the interest continuum” (Gagné, 2007, p. 99). The term passion has also been used synonymously to strong preferences or personal interests (Achter & Lubinski, 2005; Pressley, El-Dinary, Marks, Brown, & Stein, 1992). There is even an interest based school curriculum with the name “passion school concept” (Joseph, 2000).

*Passion as a personality trait:* Some researchers refer to passion as a personality trait, for example Winner (2007), who assumes that gifted children are per se full of passion. Also Csikszentmihalyi (1996) and Florida (2002) refer to passion as a characteristic of (creative) persons (see below).

*Passion as a catalyst of creativity:* Several creativity researchers link passion to creativity and claim that passion has played a crucial role in the lives and works of creative persons (Amabile, 2001; Amabile & Fisher, 2009; Averill, 2002; Csikszentmihalyi, 1996; Florida, 2002). Amabile and Fisher (2009) even claim that creativity could be fostered by stimulating passion. While all these authors seem to agree upon the beneficial effects of passion on creativity, most leave open what they understand as passion. Amabile (2001) uses the term synonymously with positive affects, intrinsic motivation and “love of a craft” (p.

335), in other articles passion is used as a synonym for creative personal interests (Savishinsky, 2001). Some researchers treat passion as a personality characteristic of creative persons, for example Csikszentmihalyi (1996), who found that most creative persons are “passionate about their work” (p. 72) and Florida (2002), who describes the lifestyle of creative persons as a “passionate quest for experience” (p. 166).

*Passion as explanation for intense learning activities and high achievement:* In the research literature on giftedness and expertise, passion is often mentioned as an explanation for motivated learning, practicing, and reaching high achievements (Achter & Lubinski, 2005; Betts & Neihart, 1986; Delcourt, 2003; Hébert & McBee, 2007; Mills, 2003; Moraes, Rabelo, & Salmela, 2004; Noble, Childers, & Vaughan, 2008; Siegle & Powell, 2004; Tirri, 2009; Wai, Lubinski, & Benbow, 2009; Watters, 2010). In most of these publications passion is merely a figure of speech. Only few of these publications report explicit theoretical arguments or empirical supports of the effect passion has on learning outcomes. Passion has also been said to explain the motivation underlying deliberate practice. Indeed, correlations between a certain form of passion (called “harmonious passion”; see Vallerand et al., 2003 and below) and measures for deliberate practice have been reported (Bonneville-Roussy et al., 2011; Vallerand et al., 2007; Vallerand, Mageau, et al., 2008).

In summary, the implicitly used term passion is mainly connoted as a stable trait or developed personal interest, which comes along with intensive positive feelings towards this activity, and which is assumed to be a form of motivation that leads to learning, achievement and enhanced creativity. In the psychological literature, most passion concepts are implicit (i.e. not clearly defined), but a few explicit and operational definitions of passion have also been suggested. These are presented in the next section.

## Current Explicit Passion Concepts in Psychology

Few explicit definitions of passion have been proposed. Some but not all of them have been operationalized and empirically investigated. These definitions overlap in some aspects (e.g. the involvement of affect), but they also differ from each other in many aspects. The explicit psychological definitions of passion are summarized in 1 and described in-depth below.

Table 1

Overview about explicit psychological conceptions of passion

Concept	Characteristics of the concept	Authors
1) The dual model of passion. Passion as a strong inclination towards an activity	Definition: “Strong inclination towards an activity that a person likes, finds important, and invests time and energy” (Vallerand et al., 2003, p. 756). It is integrated into the identity and related to persistence in the face of obstacles. Passion is differentiated into two facets: - harmonious passion (related to e.g. well-being, positive affect, maintained control over the activity) - obsessive passion (related to e.g. impaired well-being, health risks, loss of control)	e.g. Vallerand et al. (2003)
2) Passion as intrinsic motivation with identity concerns	Characterized by: “a) wanting to do the activity all the time and devoting significant time and energy to it, b) getting completely involved in the activity and experiencing flow, c) getting emotional release from the activity and d) seeing one’s identity in terms of the activity.”	Fredricks, Alfeld, and Eccles, (2010, p. 23)
3) Passion as romance with a topic or discipline	Characteristics: “powerful emotions, desires, future visions, long-term commitment to a course of action”	Renzulli et al., (2006, p. 18)

Table 1 (continued)

*Overview about explicit psychological conceptions of passion*

Concept	Characteristics of the concept	Authors
4) Entrepreneurial Passion	Passion as “an intense positive emotion”, referring to venture-related opportunities, tasks or activities, “that stimulates entrepreneurs to overcome obstacles and remain engaged” (Cardon, Wincent, et al. 2009, p. 512), characterized as motivational force, emotional energy, desire and persistence in the process of founding companies. Related to social identities of entrepreneurs	e.g. Cardon, Wincent, et al. (2009); Klaukien & Breugst (2009)
5) Passion as a component of the Triangular Theory of Love	Passion as a short term ‘limerence’ and sexual/physical attraction, characterized by high arousal, frequent thoughts about a loved person, and quick fade out.	Sternberg (1986; 1997)

*1) Passion as a strong inclination toward an activity.* The currently most influential passion definition in psychology was first published in 2003 by Vallerand and colleagues. The authors define passion as “a strong inclination toward an activity that people like, that they find important, and in which they invest time and energy” (Vallerand et al., 2003, p. 756). They differentiate between two types of passion, which differ in regard to how autonomously (in terms of being self-determined and acting out of free will, see Deci & Ryan, 1985) they are internalized into the identity of a person. “Obsessive passion (OP) refers to a controlled internalization of an activity in one’s identity that creates an internal pressure to engage in the activity that the person likes. Harmonious passion (HP) refers to an autonomous internalization that leads individuals to choose to engage in the activity that they like” (Vallerand et al., 2003, p. 756). Both types of passion can be assessed with a standardized scale (ibid.). Differential correlates were found for harmonious and obsessive passion. For example, harmonious passion is positively related to adaptive behavior, well-being, persistent



engagement in activities in the face of obstacles or setbacks, learning goals, deliberate practice, and achievement (Bonneville-Roussy et al., 2011; Philippe, Vallerand, & Lavigne, 2009; Vallerand, et al., 2007; Vallerand, Mageau, et al., 2008). Obsessive passion, on the contrary, is related to maladaptive behavior, risky and ill-advised persistence in the face of obstacles, and the loss of control over the desire to perform the activity like in problematic gambling (Philippe & Vallerand, 2007; Ratelle, Vallerand, Mageau, Rousseau, & Provencher, 2004).

2) *Passion as intrinsic motivation with identity concerns*. Fredricks and colleagues (2010) compare and relate passion with other constructs of motivational psychology. The theoretical mapping of commonalities and differences of passion with constructs such as flow, goal orientation, rage to master and others is currently the most comprehensive published attempt to clarify the incremental validity of passion in systematical comparison with the established constructs in the research on motivation. The authors argue that “for an activity to become a passion, an individual will perceive the activity as valuable, devote significant time and energy to it, hold mastery goals, choose to engage in challenging tasks, experience positive outcomes during task involvement (i.e., positive emotions, flow, and concentration), and incorporate the activity into his or her identity” (p. 20). The authors define passion operationally: In their qualitative interview study, Fredricks and colleagues categorized persons as being passionate if the following criteria were expressed in the interviews about school and leisure activities: “(a) wanting to do the activity all the time and devoting significant time and energy to it, (b) getting completely involved in the activity and experiencing flow, (c) getting emotional release from the activity, and (d) seeing one’s identity in terms of the activity.” (p. 23). The study included adolescents that were categorized as ‘talented’ for nonacademic activities (e.g. dancing or ball sports) and adolescents that were categorized as ‘gifted’ for performing very well in academic activities.

The authors found that passion was described frequently for extracurricular activities, but not for academic activities.

3) *Passion as romance with a topic or discipline.* For Renzulli and colleagues (2006), passion is a 'co-cognitive personality trait' which presumably fosters the development of giftedness (p. 17) and which is defined as follows: "When an individual is passionate about a topic or discipline, a true romance, characterized by powerful emotions and desires, evolves. The passion of this romance often becomes an image of the future in young people and provides the motivation for a long-term commitment to a course of action." (Renzulli et al., 2006, p. 18).

4) *Passion in economical contexts: intense emotions leading to persisting engagement in the face of obstacles:* Entrepreneurial passion is characterized by "consciously accessible, intense positive feelings, experienced by engagement in entrepreneurial activities, associated with roles that are meaningful and salient to the self-identity of the entrepreneur" (Cardon, Wincent, et al., 2009, p. 519). The authors gave a comprehensive overview about the different passion concepts in research articles about entrepreneurial activities. The authors summarize that most articles converge in conceptualizing passion as a strong emotion referring to "venture-related opportunities, tasks, or activities" which "has a motivational effect that stimulates entrepreneurs to overcome obstacles and remain engaged" (p. 512). Cardon, Sudek, and Mitteness (2009) differentiate between "affective passion" (enthusiasm), "cognitive passion" (preparedness), and "behavioral passion" (commitment). Many articles have claimed or found that entrepreneurial passion explains the motivation underlying engagement and persistence in the process of founding companies (Baum & Locke, 2004; Cardon, 2008; Cardon, Wincent, et al., 2009; Chen, Yao, & Kotha, 2009; Klaukien & Patzelt, 2008; Klaukien & Breugst, 2009). Some research approaches on entrepreneurial passion (Cardon, Wincent, et al., 2009; Ho, Wong, & Lee, 2011) explicitly refer to the theory and empirical

findings related to Vallerand and colleagues' (2003) dual model of passion. Thus, the concept of entrepreneurial passion resembles Vallerand's passion definition but also has unique characteristics which are not completely similar with other passion definitions (for example the focus on venture-related activities and the pronunciation of the positive valence of the involved emotion). In economy, there is a competing definition of passion that conceptualizes passion as an aspect of consumer's love to brands and products (Albert, Merunka, & Valette-Florence, 2008; Shimp & Madden, 1988). This economic passion concept goes back to Sternberg's definition of passion as part of the triangular theory of love (see below).

*5) Passion as a component of the triangular theory of love:* A model of love including passion was published by Sternberg (1986; 1997; see also Hatfield, Pillemer, O'Brien, & Le 2008). In his triangular model of love, Sternberg (1986) describes passion, commitment and intimacy as components that characterize and determine love. For Sternberg (1988), passion is the experience of short-term 'limerence' and sexual attraction, characterized e.g. by frequent thoughts about a loved person during the day. Sternberg (1997, p. 315) defines: "Passion refers to the drives that lead to romance, physical attraction, sexual consummation, and related phenomena in loving relationships. The passion component includes within its purview those sources of motivational and other forms of arousal that lead to the experience of passion in a loving relationship. It includes what Hatfield and Walster (1981, p. 9) refer to as 'a state of intense longing for union with the other'. In a loving relationship, sexual needs may well predominate in this experience. However, other needs, such as those for self-esteem, succorance, nurturance, affiliation, dominance, submission, and self-actualization, may also contribute to the experiencing of passion". In sum, Sternberg (1997) relates passion to physical attraction, sexual consummation, and desire in loving relationships that declines as time goes by.

In sum, the explicit passion definitions in psychology overlap in that they concern a strong and emotional approach motivation. There is neither consensus about the implication

of positive emotions, or commitment, nor about the bipolarity of passionate experiences.

There is also variety in regard to the measurements that have been applied in the research on the explicit concepts of passion (Cardon, Sudek, et al., 2009; Fredricks et al., 2010; Sternberg, 1997; Vallerand et al., 2003).

### **Limitations in the Current Passion Research**

The following section addresses limitations in the research on passion. First, the limitations of the explicit psychological passion concepts (see above) are discussed. Then we depict problems that are generally related to the use of the term passion in different research areas, namely the terminological ambiguities in the use of the term passion, and the lacking evidence for the incremental validity of the passion construct.

#### **Limitations of Explicit Approaches in Passion Research**

The described explicit research approaches on passion have some limitations and leave open some questions, which are addressed in the following.

1) *Limitations concerning the dual model of passion (Vallerand et al., 2003)*: The dual model of passion is the best studied passion concept in psychology. Strengths of the dual model of passion are its clear operational definition, the possibility to measure passion with an easy applicable scale, the numerous empirical studies and the differentiation between types of passion and between their differential outcomes. Since the dual model of passion is the most explicit and most frequently published in psychology, it is rich of insights but also of limitations.

One limitation related to the dual model of passion is the incoherence regarding the involved components. For example, one *essential* component of the dual model of passion is ‘liking’, which is a hedonic and pleasurable experience. According to the authors, liking is a condition sine qua non of passion (Mageau et al., 2009; Vallerand et al., 2003). This definition, however, is incompatible with the definition of a non-hedonic, aversive form of

passion called obsessive passion and with the empirical findings that this type of passion is unrelated<sup>1</sup> with hedonic experiences (Philippe et al., 2010; Vallerand, et al., 2006). Hedonic emotions can co-occur with obsessive passion, but they are no essential aspect of this experience. We argue that a possible solution to this antinomy lies in the conceptual differentiation between ‘liking’, which is a hedonic experience and ‘wanting’, which is a desire and approach motivation (see Berridge, 2007; Berridge, Robinson, & Aldridge, 2009; Davis et al., 2009). Whereas the ‘wanting’-aspect (desire, strong approach motivation) is inherent to all explicit passion definitions in psychology (Fredricks et al., 2010; Philippe, Vallerand, & Lavigne, 2009; Renzulli et al., 2006; Vallerand et al., 2003), there is a conceptual conflict between the hedonic ‘liking’-aspect and all forms of passion that are not hedonic experiences, such as obsessive passion (see above). Without doubt, many passionate activities are liked, that is to say, hedonic experiences (Philippe et al., 2010), but liking is rather a dispensable correlate than a *conditio sine qua non* of passion according to the empirical findings so far. This should be reflected in the definition.

The second component of Vallerand’s passion definition – finding an activity ‘important’ – is vague, because it remains unclear if ‘personal importance’ refers to preferences, task values, salience, attitudes, investment willingness or a combination of these aspects. Mageau et al. (2009) use ‘finding important’ synonymously with ‘value’ and claim that this aspect by definition distinguished passion from other interesting and intrinsic but unimportant/valueless activities. This idea conflicts with other, more explicit and well-studied concepts of (task) value (see Eccles, 2007), which imply that intrinsic experiences are per se valuable, since intrinsic experiences form part of the subjective value of an activity rather than being independent from task value. It is desirable to clarify the specific meaning of the term

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<sup>1</sup> In one study, obsessive passion is not unrelated but negatively related with positive emotions (Mageau et al., 2005).

‘personal importance / value’ and to point out how this definition is linked to the definitions of the same term used by other authors.

The third component of the passion definition – investment of time and energy – is problematic because it depends on the factual accessibility of resources and less on psychological states such as willingness to spend these resources. Psychological states might latently outlive periods of scarcity of resources (e.g. time), and we believe that this disposition might be more important to the psychological understanding of passion than the factual accessibility of resources and the manifest behavior of investing them. In addition, if spending resources is part of the definition, then the finding that passion is empirically related to spending resources (e.g. persistence) is tautological and not the validating insight as which it was used in some papers on passion (e.g. Bonneville-Roussy et al., 2011; Vallerand et al., 2003).

The fourth component of the passion definition –integrating the activity into the identity– is ambiguous, because identification has many facets (see below), wherefore this component of passion requires further specification.

Vallerand and colleagues conceptualize passion as a stable trait with influences on long-term developmental processes and on the ‘worth of life’ in general (Philippe et al., 2010; Vallerand et al., 2003, p. 756 & 757). However, as Vallerand (2008) puts it, this assumed long-term stability and the hypothesized outcomes have not been proven yet and most studies on passion were cross-sectional or used only short-term longitudinal designs (Amiot et al., 2006; Mageau et al., 2009; Vallerand, et al., 2006; Vallerand et al., 2007).

To sum it up, the dual model of passion from Vallerand and colleagues is the most elaborated concept in current psychology. It has many strengths that other concepts lack (e.g. the clear and operational definition and the extensive empirical studies). Further strengths of this research line are the numerous empirical studies on the correlation of passion with many other constructs of mostly positive psychology. However, these impressive approaches still

leave open the following research gaps which should encourage future studies with more diversified study designs. From a theoretical point of view, the definition of passion misses clear references to established psychological theories and a systematical discussion of similarities and differences between passion and traditional motivational concepts is missing. Additionally, neither predictors nor outcomes of Vallerand's model have been satisfactorily investigated and supported by appropriate longitudinal studies. As a consequence of all these issues, evidence for the incremental validity of the concept passion is still missing.

*2) Limitations of the concept of passion as intrinsic motivation with identity concerns:*

One strength of the publication about passion in educational settings authored by Fredricks et al. (2010) is the comprehensive mapping of the overlaps between passion and related constructs. The documented similarities between the motivational constructs require further empirical studies on the incremental validity of the passion construct. Fredricks and colleagues' definition and measurement overlap with the dual model of passion from Vallerand and colleagues, but both approaches differ from each other in some aspects (e.g. the characteristics wanting to do the activity all time and getting emotional release from the activity). Given these differences, a consensus about the adequate definition and measurement of passion is still needed.

*3) Limitations of the definition of passion as a co-cognitive trait (Renzulli et al.,*

*2006):* The definition of passion as a co-cognitive trait is explicit but entangled with assumptions about outcomes. The definition is not operational and we do not know about any empirical study based on that definition of passion.

*4) Limitations in the research on entrepreneurial passion:*

The research on entrepreneurial passion has important strengths, particularly the very comprehensive review of passion concepts in economic contexts compiled by Cardon, Wincent, and colleagues (2009). Obviously, a limitation of the approach to entrepreneurial passion is its context-specificity. The definition and measurement of entrepreneurial passion cannot be applied to

other domains such as learning activities in sport or school, and therefore this concept does not solve the problems related to the definition and assessment of passion in those contexts that are frequently addressed in many publications on passion.

5) *Limitations of passion as a component of the triangular model of love*: This definition of passion differs much from most other passion notions in psychology, which include more long-term, commitment-like characteristics. For Sternberg (1997), passion and commitment<sup>2</sup> are independent components of love, but although passion and commitment are theoretically separated in the triangular model of love, some passion items empirically load on the commitment factor and vice versa.

Some problems in the research on passion do not concern specific explicit concepts, but more generally concern inconsistent uses of the term across research lines, and the lacking empirical evidence for basic assumptions. These issues are addressed in the following sections.

#### Terminological Ambiguities

Due to terminological ambiguities, the term passion currently mystifies more than it explains. In the usage of the term passion, two crucial terminological ambiguities coincide, which are called “jingle and jangle fallacies” (Block, 1995). “Jingle fallacies occur where two different things are labeled with the same term, and jangle fallacies occur where the same thing is labeled with two different terms.” (Peck, 2007, p. 1129).

In the case of passion, jingle fallacies occur because the term is used implicitly in many publications without being defined, operationalized or empirically studied (Achter &

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<sup>2</sup> It should be noted that Sternberg applies an own definition of commitment, and does not refer to the definitions which are referred to in this text. He defines: “Decision/commitment refers, in the short-term, to the decision that one loves a certain other, and in the long-term, to one's commitment to maintain that love.” (Sternberg, 1997, p. 315).



Lubinski, 2005; Amabile, 2001; Amabile & Fisher, 2009; Gottfried & Gottfried, 2004; Hébert & McBee, 2007; Noble et al., 2008; von Károlyi & Winner, 2005). Moreover, the few explicit definitions of passion overlap, but do not coincide fully in terms of their definitional components, their measurements and their assumptions concerning the construct (Cardon, Wincent, et al., 2009; Fredricks et al., 2010; Renzulli et al., 2006; Sternberg, 1997; Vallerand et al., 2003). As a result, different phenomena are labeled with the same term passion.

Jangle fallacies occur because there is hardly a discussion about the overlaps of the passion construct with other constructs of motivational psychology. Only Fredricks and colleagues (2010) provide a first mapping of constructs related to passion. Consequently, some passion concepts overlap with other constructs, or even become synonyms. For example, Gagné (2007), and Achter and Lubinski (2005) treat passion as a synonym for strong interests while von Károlyi and Winner (2005) use passion as a synonym for the motivational construct “rage to master”, which is a strong achievement motivation, typically described in the context of gifted education. Such an unsystematic renaming of existing psychological constructs impedes the integration of insights related to each of the respective labels. Another problem of such jangle fallacies is that they distract researchers from recognizing unique characteristics of the involved constructs, and commonalities and differences between the new and the established constructs. A third problem is that jangle fallacies also conflict with the principle of parsimony. Jangle fallacies concerning passion can be avoided by systematically mapping conceptual commonalities and differences of passion with related constructs in the field and particularly by pointing out overlaps of these concepts.

#### Lacking Evidence for Incremental Validity

Closely related to the problem of jangle fallacies is the question whether passion explains anything that has not been explained by established concepts. If it did not, then there were hardly arguments for the implementation a new construct like passion. In detail, establishing passion as a psychological construct it could be shown that passion a) has some unique

features and is not equivalent to already established constructs, b) fills a theoretical gap which cannot be filled with already established constructs and/ or c) integrates previously unconnected fields of knowledge or constructs in a combined meta-theoretical model. As reported above, there is no empirical evidence for the incremental validity of the passion construct. Thus, to date it is unknown if passion can explain any observable behavior or mental process that has not yet been explained by already established motivational constructs.

The determination of the incremental validity requires criteria, in other words: phenomena which are not fully understood yet and that can possibly be explained by passion. This is the issue of the following paragraph.

The psychological use of the term passion in a nutshell: There are many psychological texts that regard passion as an important explanation for diverse phenomena. In most of them, the term passion is used in an implicit way without a proper and clear definition, but there are a few explicit definitions for the term. There is no consensual definition, nor measurement, and the diverse definitions are plagued by terminological ambiguities, lacking empirical evidence for incremental validity and lacking evidence for crucial assumptions such as the assumed long-time stability and outcomes of passion. Moreover, passion researchers who apply one particular definition many times ignore the others. For many passion researchers, the most important outcome of passion is intense, emotional motivation to engage in activities that even persists in the face of obstacles.

### **The New Construct's Niche: Motivation to Persist in Deliberate Practice**

As we have shown, a crucial limitation of previous research on passion is the lacking evidence for the incremental validity of the construct. But what is a useful criterion for the incremental validity of passion? Which phenomenon requires explanation and is likely to be explained by passion? There are several candidates: Passion has been declared to explain many motivational phenomena such as persistent engagement in activities (Vallerand et al.,

2003), performance (Bonneville-Roussy et al., 2011; Vallerand et al., 2007; Vallerand, Mageau, et al., 2008), flow (Fredricks et al., 2010; Vallerand et al., 2003), and even symptoms of dependency (Burke, 2008; Burke & Fiksenbaum, 2009b; Mageau et al., 2005; Philippe & Vallerand, 2007; Ratelle et al., 2004; Rip, Fortin, & Vallerand, 2006; Rousseau, Vallerand, Ratelle, Mageau, & Provencher, 2002; Wang & Chu, 2007; Wang & Yang, 2007). However, convincing arguments for the *unique* contribution of passion to the explanation of these phenomena are generally lacking.

#### The Missing Link: The Motivation Underlying Deliberate Practice

A particular phenomenon is the motivation to persist in deliberate practice over a long period of time. Deliberate practice is a highly structured, highly concentrated, instructed and purposive form of practice with the explicit aim to improve skills that is required in the process of becoming an expert (Ericsson, Krampe, & Tesch-Römer, 1993; Ericsson, Roring, & Nandagopal, 2007; Gembris, 2006). The motivation underlying such practice is not sufficiently investigated (Bonneville-Roussy et al., 2011; Ericsson & Charness, 1994; Gembris, 2006). Theoretical assumptions and research findings regarding this motivation are somewhat inconsistent: It was claimed that deliberate practice was incompatible with intrinsic experiences and that even extrinsic rewards were rare in that context (Ericsson et al., 1993; 2007). However, several studies have shown the compatibility of deliberate practice with intrinsically motivated forms of practice (Côté, Baker, & Abernethy, 2003; Helsen, Starkes, & Hodges, 1998; Moraes et al., 2004; Salmela & Moraes, 2003; Scanlan, Carpenter, Schmidt, Simons, & Keeler, 1993; Soberlak & Côté, 2003; Starkes, 2000). But these studies merely show that deliberate practice can *coexist* with intrinsic learning experiences, but they hardly specify the motives that *underlie* the engagement and persistence in deliberate practice itself.

This missing link is interesting because many arguments indicate that the motivation that is present in the context of the acquisition of expertise has some characteristics which cannot be described adequately by common motivational theories: First of all, experts-to-be

need to invest much time into practice (about 10.000 hours of deliberate practice, c.f. Ericsson et al., 1993), which requires so many personal resources over such a long time and probably interferes so many times with other personal goals, that only a very strong motivation seems likely to compensate for such costs and the consequent aversive experiences. However, the experience of the practice itself is nothing more intrinsic than the described consequences: According to Ericsson and colleagues, deliberate practice is an aversive, frustrating and anything but intrinsic experience due to its strong focus on problematic, to-be-improved performances (Ericsson et al., 1993; 2007 which is why classic intrinsic motives such as the experience of flow (Csikszentmihalyi, 1996), or competence and autonomy (Deci & Ryan, 1985) are strongly limited during the exercises.

#### The Contribution of Passion and Related Constructs to the Understanding of Motivation for Deliberate Practice

In contrast with the aversive experiences, many people who persistently practice deliberately claim to be intensively motivated to the point that they call this a passion (Bonneville-Roussy et al., 2011; Fredricks et al., 2010). Also, researchers have discussed passion as one possible explanation for the motivation underlying deliberate practice (Bonneville-Roussy et al., 2011; Fredricks et al., 2010; Moraes et al., 2004; Vallerand et al., 2007; von Károlyi & Winner, 2005). We argue that the term could be well suited for the explanation of the named phenomenon, because passion traditionally describes an intensive and persistence approach motivation that withstands obstacles, setbacks, demanded sacrifices and other aversive experiences (see above). However, passion is not the only construct that might be suited for the explanation of behavioral persistence in the face of obstacles and/or aversive activities. The concept of commitment has also been designed to explain how “attracting powers overwhelm repelling forces” (Le & Agnew, 2003, p. 37). Since passion and commitment are both supposed to explain persistence in the face of obstacles, and because this could limit the incremental validity of the construct passion, we review

conceptions of commitment and discuss commonalities and differences of passion and commitment in the following section. As a conclusion, we then suggest a synthesis of both conceptions in order to avoid jangle fallacies.

### **Integrating Different Passion and Commitment Concepts in Order to Overcome Terminological Ambiguities and to Explain the Motivation to Persist in Deliberate Practice**

The following section describes concepts of commitment and summarizes commonalities and differences between concepts of commitment and concepts of passion. Integrating both research lines, we then suggest to conceptualize passion as the co-occurrence of high commitment and intense approach motivation.

#### **Characteristics of Commitment in Different Theoretical Frameworks**

The commitment concepts addressed here concern the investment model of commitment from Rusbult and colleagues (Rusbult, 1980; Rusbult, Martz, & Agnew, 1998) - including further elaborations of this model such as organizational commitment (Allen & Meyer, 1990) and the sport commitment model by Scanlan and colleagues (1993; Scanlan, Russell, Magyar, & Scanlan, 2009) - and goal commitment as discussed within the goal setting theory by Latham and colleagues (Klein, Wesson, Hollenbeck, & Alge, 1999; Latham & Locke, 1990; Latham, Ganegoda, & Locke, 2011). According to these models, commitment explains behavioral persistence in goal-directed activities.

The investment model of commitment defines commitment as the “intent to persist in a relationship” (Rusbult, Martz, et al., 1998, p. 359). Thus, such commitment is a psychological state. It predicts the persistence in a romantic relationship even despite aversive experiences such as lacking relationship satisfaction (for a review see e.g. Rusbult & Buunk, 1993). “Thus, commitment can be seen as the degree to which attracting powers overwhelm repelling forces” (Le & Agnew, 2003, p. 37; see also Adams & Jones, 1997; Arriaga &

Agnew, 2001; Johnson, 1991; Levinger, 1988). According to Rusbult, Martz and colleagues' (1998) model, commitment consists of three components and is predicted by three antecedents, all of which are depicted in Table 2. The original model was further elaborated and applied to the prediction of persistence in sport activities (Scanlan et al., 1993; 2009) and it influenced the works on organizational commitment (Allen & Meyer, 1990; Meyer & Allen, 1991). These three related commitment models (investment model of commitment, sport commitment and organizational commitment) differ slightly in terms of the included predictors, components and outcomes of commitment, which is summarized in the following table.

Table 2

*Structural commonalities and differences of different commitment models*

Commitment Model	Predictors	Components / Forms	Main outcomes
Investment Model of Commitment (Rusbult, Martz, et al., 1998)	Satisfaction Quality of Alternatives Investment	intent to persist long-term goals Psychological attachment / feeling of 'we-ness'	Persistence in relation / organization
Sport Commitment (Scanlan et al., 1993; 2009)	Sport Enjoyment Valuable opportunities Other priorities Personal Investment Social Constraints Social Support	<i>No components specified in the model</i>	Persistence in sport activity
Organizational Commitment (Allen & Meyer, 1990; Meyer & Allen, 1991)	<i>No components specified in the model</i>	Affective Commitment Normative Commitment Continuance Commitment	Persistence in organizations

The second framework of commitment concepts that we consider as relevant for the research on passion is goal commitment within the goal-setting theory. The research on goal commitment differs in a few aspects from the previously described commitment models and is therefore depicted separately here. Whereas the above described commitment models predicted persistence *in relationships, organizations or courses of action*, goal commitment more specifically predicts persistence *in goal striving* (Hollenbeck & Klein, 1987; Kleinbeck, 2011; Latham & Locke, 2007; Latham et al., 2011; Locke, Shaw, Saari, & Latham, 1981;

Metz-Göckel & Leffelsend, 2001; Tubbs, 1993)<sup>3</sup>. Goal-commitment typically refers to one specific goal. Locke and Latham (1990) describe goal commitment as one's determination to reach a goal. In this tradition, Nenkov and Gollwitzer (2012) define goal commitment as "[...] the extent to which personal goals are associated with a strong sense of determination, with the willingness to invest effort, and with impatient striving for goal implementation" (p. 8). Theoretically, goal commitment mediates the motivational effect of goals on behavior (Klein et al., 1999; Klein, Wesson, Hollenbeck, Wright, & DeShon, 2001; Metz-Göckel & Leffelsend, 2001). Only with goal commitment there is a motivational effect of goals that makes individuals extend effort toward goal attainment, show persistence in pursuing that goal over time, and have an unwillingness to lower or abandon that goal (Klein et al., 2001). Empirical evidence for the effect of goal commitment on persistence and performance was reported by Bipp and Kleinbeck (2011), Klein and colleagues (1999), Latham and Locke (2007), and Seijts and Latham (2001). The impact of goal commitment on behavior is enhanced by the subjective identification of an individual with the goal (Brunstein, Dargel, Glaser, Schmitt, & Spörer, 2008). Kleinbeck (2011) even argues that only internalized goals influence behavior. According to the mindset model of action phases (Heckhausen & Gollwitzer, 1987), goal commitment increases in the post-decisional mindset. Evidence for this assumption was published by Nenkov and Gollwitzer (2012), who showed that pre-decisional participants report less goal commitment than post-decisional ones.

#### Commonalities and Differences Between Passion and Commitment

Commitment and passion are frequently discussed together, although in varying functions – commitment as a synonym for passion, as a characteristic of passion, or as a complementation to passion (Bélanger, Lafrenière, Vallerand, & Kruglanski, 2012; Bierly III,

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<sup>3</sup> This is not necessarily a different criterion; it is basically a different perspective on that criterion: not the context but the aspired outcome of the persistence is pronounced in the goal-commitment literature.



Kessler, & Christensen, 2000; Bonneville-Roussy et al., 2011; Bullis, Clark, & Sline, 1993; Crosswell & Elliott, 2004; Fredricks et al., 2010; Hopfl, 2000; Kottler, 2000; Renzulli et al., 2006; Sternberg, 1986; Vallerand, 2008)<sup>4</sup>. It is therefore necessary to analyze the overlaps between both constructs theoretically in order to avoid jangle fallacies.

Like passion, the term commitment is often mentioned but frequently ill-defined and plagued by terminological ambiguities and the lack of a consensual definition (Moser, 1996). To avoid ambiguities, we here consider two important commitment concepts which share central characteristics with the described passion concepts and avoid references to implicit (i.e. not clearly defined) commitment concepts.

The described commitment concepts, particularly the investment model of commitment and the sport commitment model, share crucial characteristics with passion. Table 3 provides an overview about these commonalities. The first column lists commonalities of both constructs and the other columns assign references to the respective commonality. Each issue is explained below the table.

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<sup>4</sup> These authors relate passion with the *term* commitment, but don't refer to the commitment *models* of Rusbult and colleagues nor Scanlan and colleagues.

Table 3

*Commonalities of passion with commitment concepts*

Common characteristic: <i>both constructs...</i>	References passion research	References commitment research
1) ...include the components or correlates: a) intention, b) long-term goals and c) identification.	For component a), see Fredricks et al. (2010); for component b), see Bonneville-Roussy et al. (2011), and Renzulli et al. (2006), for component c) see Donahue, Rip, & Vallerand (2009); Fredricks et al. (2010); Vallerand et al. (2003)	Rusbult, Bissonnette, Arriaga, and Cox (1998); for component c) see also van Dick (2004)
2) ...include affect intensity as a pronounced characteristic.	Renzulli et al. (2006); Cardon, Wincent, et al. (2009)	Allen & Meyer (1990); Meyer & Allen (1991)
3) ...integrate intrinsic and extrinsic motives in a combined model	Vallerand et al. (2003) intrinsic: harmonious passion, extrinsic: obsessive passion	intrinsic experiences of commitment: Scanlan et al. (1993; 2009); extrinsic experiences of commitment: Rusbult, Bissonnette, et al. (1998)
4) ...describe psychic states that refer to an activity or course of action.	Vallerand et al. (2003); Renzulli et al. (2006); Fredricks et al. (2010)	Scanlan et al. (1993; 2009)
5) ...predict persistence, even in the face of aversive experiences such as obstacles and dissatisfaction.	Vallerand et al. (2003)	Rusbult, Bissonnette, et al. (1998); Scanlan et al. (2009) Meyer & Allen (1991) Latham et al. (2011)
6) ...are described as relatively stable, having long-term effects.	Vallerand et al. (2003; 2006) Philippe et al. (2010)	Rusbult, Bissonnette, et al. (1998)

Table 3(continued)

*Commonalities of passion with commitment concepts*

Common characteristic: <i>both constructs...</i>	References passion research	References commitment research
7) ...are conceptualized as double edged swords with positive and negative outcomes.	Vallerand et al. (2003)	Drigotas, Rusbult, & Verette (1999); Rusbult, Martz, et al. (1998)
8) ...include ill-advised, irrational and risky persistence with negative consequences.	“Obsessive passion”: Vallerand et al. (2003)	Rusbult, Bissonnette, et al. (1998); Brockner (1992); Staw (1976; 1997)
9) ...are related to symptoms of psychic dependence.	Burke, (2008); Burke & Fiksenbaum, (2009a; 2009b); Philippe & Vallerand (2007); Ratelle et al. (2004); Rip et al. (2006); Wang & Chu (2007); Wang & Yang (2007)	Kelley, (1979); Kelley & Thibaut, (1978); Thibaut & Kelley, (1959)

These statements are explained in the following.

*Commonality 1: Components.* All components that are central to Rusbult and colleagues' (Rusbult, Martz, et al., 1998) definition of commitment ('intent to persist', 'long-term goals' and 'psychological attachment/feeling of we-ness') are also typical components in most conceptions of passion. The intent to persist in the activity and to perform the activity continuously is typical for most passion concepts (see e.g. Fredricks et al., 2010) as well as for commitment (Rusbult, Martz, et al., 1998). The second component, long-term goals with reference to the respective activity or relation are typical for commitment (ibid.) as well as for passion (Bonneville-Roussy et al., 2011; Renzulli et al., 2006). The third component is the

identification with the activity<sup>5</sup>, which is also typical for the different commitment concepts (Brunstein et al., 2008; Kleinbeck, 2011; Rusbult, Martz, et al., 1998; van Dick, 2004) as well as for various passion concepts (Donahue et al., 2009; Fredricks et al., 2010; Vallerand et al., 2003).

*Commonality 2: Intense emotions.* Intense approach motivation (= urging desire, wanting, characterized by high arousal affect, see Brehm & Self, 1989) is a crucial characteristic of most passion concepts (Cardon, Wincent, et al., 2009; Renzulli et al., 2006; Sternberg, 1997). In contrast, in the research on commitment, motivational intensity is not often addressed and commitment can be thought without motivational intensity. However, at least positive intense emotions are emphasized in the component of affective commitment within the concept of the organizational commitment (Meyer, Stanley, & Parfyonova, 2012). Also, Scanlan and colleagues (2009) include positive and intense affects (enjoying) not among the components but among the predictors of sport commitment.

*Commonality 3: Combination of intrinsic and extrinsic motives.* Commitment in terms of Rusbult, Wincent, and colleagues (1998) and in terms of Scanlan and colleagues (1993; 2009) explains voluntary persistence even while the object of the commitment (relationship or sport activity) is not experienced as enjoyable, but as aversive. On the other hand, both commitment concepts are positively correlated with and predicted by intrinsic experiences such as joy and satisfaction (ibid.). Commitment is influenced by intrinsic experiences but also by extrinsic reinforcers such as the calculation of the loss of investment that would result from detachment from a relationship or a sport activity (Rusbult, Martz, et al., 1998; Scanlan et al., 2009). According to Rusbult and colleagues and Scanlan and colleagues, intrinsic and extrinsic motives can compensate the lack of the respective other, but they may also co-occur and strengthen the commitment together. Such an integration of intrinsic and extrinsic

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<sup>5</sup> or person, see Rusbult, Wincent, et al. (1998)

motives in one model is also a crucial characteristic of the dual model of passion (Vallerand et al., 2003).

*Commonality 4: Psychic states that refer to an activity / course of action.* Commitment is an inclination of a person to stay in a sport activity (Scanlan et al., 1993; 2009) or in other courses of action like goal striving (Klein et al., 1999) or in a relationship (Rusbult, Martz, et al., 1998) or in an organization (Allen & Meyer, 1990). Commitment is expressively not defined as manifest behavior, but as a mental state or a person's disposition to persist in a given course of action (Scanlan et al., 1993; 2009). Equally, some authors define passion as a tendency of a person to engage in specific types of activities (Cardon, Wincent, et al., 2009; Fredricks et al., 2010; Vallerand, et al., 2003).

*Commonality 5: Prediction of persistence in the face of obstacles.* Like passion, commitment is a predictor of persistence according to the theories that were depicted in this article, such as the goal setting theory (Latham et al., 2011; Locke & Latham, 1990), the investment model of commitment (Rusbult & Buunk, 1993), the sport commitment model (Scanlan et al., 1993; 2009) and the research on organizational commitment (Meyer, Becker, & Vandenberghe, 2004). In detail, the sport commitment model from Scanlan and colleagues (1993; 2009) is very similar to most concepts of passion (Cardon, Wincent, et al., 2009; Fredricks et al., 2010; Renzulli et al., 2006; Vallerand et al., 2003), because it is supposed to explain the same phenomenon: the motivation to persist in (sport) *activities* that withstands obstacles (Rusbult, Martz, et al., 1998; Scanlan et al., 1993; 2009) and - in the case of obsessive passion - aversive experiences (Vallerand et al., 2003).

*Commonality 6: Stable trait-like phenomena with long-term effects.* Passion is hypothesized to remain stable across long time periods (Renzulli et al., 2006; Vallerand et al., 2006). Commitment is also conceptualized as relatively stable and as an explanation to stable behavioral tendencies (Rusbult, Martz, et al., 1998).

*Commonality 7: Double-edged sword.* Both passion and commitment have been described as a “double-edged sword” (Drigotas et al., 1999, p. 392; see also Rusbult, Bissonnette, et al., 1998; Vallerand, et al., 2003), with a constructive form leading to well-being and the realization of personal motives, and a destructive form leading to goal conflicts, dependence, and persistence in the face of dissatisfaction. According to Drigotas and colleagues (1999), the characteristic of commitment as a double-edged sword results from the interpersonal dependence. A high commitment is advantageous for the persistence in a relationship and the fulfillment of the associated personal motives, but high commitment is also a risky dependence on one exclusive option of need satisfaction. Likewise, the dual model of passion (Vallerand et al., 2003) describes a similar phenomenon with a beneficial as well as a ruinous form.

*Commonality 8: Ill-advised persistence with negative consequences.* Both, theories about passion and about commitment provide answers to the questions how and why people persist in a course of action despite risks and negative consequences. The urging motivation to persist despite ruinous consequences had been related to passions for centuries (see Dixon, 2003) and it is conceptualized in Vallerand’s ‘obsessive passion’. The analogous commitment construct is called ‘escalation of commitment’ (Brockner, 1992; Staw, 1976; 1997), which describes the persistence to a previously selected and currently failing course of action in “only those situations where objective evidence indicates that continuing with an investment is unwise, and yet an individual chooses to invest further in spite of this” (Kelly & Milkman, 2013)<sup>6</sup>.

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<sup>6</sup> It should be noted the construct ‘escalation of commitment’ is recently discussed controversially, since new publications discuss alternative explications for the related behavior (Schulz-Hardt, Thurow-Kröning, & Frey, 2009).

*Commonality 9: Dependency.* Commitment origins from the interdependence-theory (Kelley, 1979; Kelley & Thibaut, 1978; Thibaut & Kelley, 1959) and explains similar to most passion concepts the relation of a person towards an activity with more or less pronounced symptoms of psychic dependence. Obsessive passion was related to symptoms of dependency in many studies, for example in the context of problematic gambling (Mageau et al., 2005; Philippe & Vallerand, 2007; Ratelle et al., 2004; Rousseau et al., 2002), online playing and shopping (Wang & Chu, 2007; Wang & Yang, 2007).

In sum, concepts of passion and commitment have many commonalities. Most important, both concepts hypothetically explain the same outcome (persistence in the face of obstacles and aversive experiences). Both constructs have in common central components, correlates and other characteristics.

Thus, the current concepts of passion and commitment overlap in most aspects and we see hardly differences, in particular given that the conceptualizations of passion and commitment are also heterogeneous itself. We suggest that both concepts should be integrated to avoid jingle and jangle fallacies.

#### Building a Bridge: Synthetic Framework for Understanding Passion as an Affect-Intense Form of Commitment

According to our understanding of the relevant literature, passion can be defined as the co-occurrence of commitment and intense approach motivation; or in other words: as a motivationally intense form of commitment towards a course of action. Differentiating between specific components of commitment, we specify that passion is characterized by four components<sup>7</sup>: a) continuous intent to engage in the activity, b) goals with reference to the

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<sup>7</sup> This definition only includes *necessary* components of passion. Components which are closely related but not necessary for the existence of passion (such as liking and flow) are not included in the definition but considered as correlates, outcomes and/or predictors.

activity, c) identification with the activity, and d) intense approach motivation, being characterized by high arousal affect and urging desire to engage in the activity. The single components of this definitions as well as their hypothetical interaction with each other are shortly described in the following.

*a) Continuous intent to engage in the activity:* Following Kuhl and Kazén (1999, p. 382), we refer to the term intention as “an action plan held in an active state”. Intention pre-requires a decision and thus refers to post-decisional cognitions and actions. A passionate person is expected to continuously intent to engage, re-engage and persist in a passion-related activity. This includes pre-goal cognitions such as planning the next opportunities to engage in the activity, and mental preparation of instrumental behavior aiming at realizing the activity and overcoming anticipated obstacles or inferences. We assume that a particularity of a passion is that related intentions do not expire when a certain action plan is realized, but that they endure in form of intentions to continue and extend an activity, or in form of post-activity mental occupation with aspects of an activity which was recently ended (e.g. self-evaluation and specific plans how to improve or what to change the next time).

*b) Goals with reference to the activity:* The second component of our proposed passion definition concerns goals. Passion researchers agree in that goals (or “visions of the future”, see Renzulli et al., 2006) are central characteristics of passion (Bélanger et al., 2012; Fredricks et al., 2010). Goals are defined as mental representations of intended outcomes (Kuhl & Kazén, 1999). Most studies relate different concepts of goals as predictors or outcomes of passion. For example, Fredricks et al. (2010) discuss that the experience of passion might benefit from learning environments that facilitate mastery goals and whereas performance goals might derogate the experience of passion. In contrast, Bonneville-Roussy et al. (2011) found that mastery goals predicted harmonious passion, whereas performance goals predicted obsessive passion. Fredricks et al. (2010) discuss the contribution of clear and



challenging goals to the experience of passion, assuming that these will facilitate the experience of flow, which in turn plays a role in the experience of passion (see also (Carpentier et al., 2012; Philippe, Vallerand, Andrianarisoa et al., 2009; Vallerand et al., 2003). Bélanger et al. (2012) linked passion to goal commitment and found that different types of passion lead to different strategies in dealing with goal conflicts.

Additional to these links between passion and goal concepts, we assume that goals are more than predictors or outcomes of passion, and we rather conceptualize goals as components of passion. According to our understanding, having a passion for an activity necessarily implies setting goals that refer to this activity. Such goals can for example refer to performances a person want to achieve in the activity, or to aspired acquisitions with reference to the activity, or to the creation of possibilities to spend more time with the activity, or they can even concern vocational choices with reference to the activity. We believe that particularly medium-term and long-term goals contribute to the stability of passion, because they will nourish the motivation to persist in the striving even in situations in which more instable components of passion such as specific intentions and motivational intensity are absent.

*c) Identification with the activity and other aspects of self-concept involvement:*

Identity and self-concept are a person's mental representations of the characteristics of herself. The self-concept "is our perception of ourselves; in specific terms, it is our attitudes, feelings and knowledge about our abilities, skills, appearance, and social acceptability" (Byrne, 1984, p. 429), including self-images of the past, present and possible future selves, that are built through self-evaluation (e.g. Gniewosz, Eccles, & Noack, 2011).

Identity, according to one current definition, "refers to a maintaining 'self-sameness' and continuity through changes and movements across time and spaces" (Lichtwarck-Aschoff, van Geert, Bosma, & Kunnen, 2008, p. 372). There are numerous definitions of both

identity and self-concept, and several levels and time perspectives that should be considered in the research on both concepts (Lichtwarck-Aschoff et al., 2008; Peck, 2007), and for the sake of clarity we discuss here only those aspects of these concepts that seem important for the understanding of passion and persistence in activities. Many passion researchers agree in that identification with an activity or some form of self-concept involvement play important roles in the experience of passion. For example, seeing one's identity in terms of the passionate activity is an essential aspect of passion according to Vallerand et al. (2003) and Fredricks et al. (2010), and Donahue et al. (2009) found that different types of passion were related to different processing of self-threat and self-affirmation. Furthermore, according to Vallerand and colleagues (2003), the specific form of identification with an activity determines the resulting type of passion. According to this theory, harmonious passion is the result of autonomous internalization, whereas obsessive passion is the result of controlled internalization in terms of Deci and Ryan's (1985) self-determination theory.

In addition to these links between passion and identification, we would like to discuss future selves that may be important to the understanding of passion and particularly to the understanding of long-term persistence despite obstacles and aversive experiences. The understanding of such persistence could benefit from a concept of goals that has not been linked to passion before: the concept of identity goals. Identity goals are goals that refer to intended outcomes concerning the identity of a person (Gollwitzer, 1987). These are cognitive representations of conditions of oneself that an individual intends to reach. Correspondent self descriptions are for example "I aspire to be a sportsman" or "I aspire to be an intelligent person". Identity goals are hierarchically superordinate to most other individual goals, that is to say: Identity goals organize other, more specific goals in a way that is beneficial for the realization of their intended outcome. Identity goals are predominant stable over long time periods (Brunstein & Mann, 2000; Gollwitzer, 1987) and consequently explain behavioral tendencies that remain persistent over time. They can even explain the persistence in the face

of obstacles and/or during aversive activities, because commitment and volitional strength to self-definitional ideals even become stronger in the face of obstacles (Gollwitzer & Wicklund, 1985; Gollwitzer, 1986). For example, a person who strongly identifies with being a world class sprinter but is performing below world class level is supposed to practice even harder in order to achieve her self-definitional ideal. Such commitment bridges identity theories with goal-setting theories, and we claim that this is very useful for the understanding of long-term motivational persistence in the face of obstacles and experiences of frustration.

Together with the above described component of goals, identity and self-concept involvement is the second component in our passion concept that might explain the assumed stability of passion and its assumed influence on long-term persistence in an activity. Particularly the overlapping of the components goals and identity in the research of identity goals (see above) seems interesting to the understanding of the stability of passion and engagement in activities.

We believe that the structure, development and effects of passion could be better understood if different aspects of self-concept involvement were disentangled in future studies.

*d) Desire (Approach motivation intensity):* The fourth component of the passion definition that we propose is approach motivation intensity. This is an urging desire, characterized by high arousal affects of any valence. High arousal affects form part of most passion concepts (Cardon, Wincent, et al., 2009; Frijda, 2007; Renzulli et al., 2006; Sternberg, 1986), whereas commitment concepts usually do not refer to the affective intensity. In regard to the valence of the involved affect, there is disagreement: Several studies have shown that positive affect characterizes passion and commitment (Fredricks et al., 2002; Scanlan et al., 2009; Vallerand et al., 2003). In line with this, Vallerand and colleagues define ‘liking’, which is a hedonic, positive-affective experience, as an essential

general component of any passion (Mageau et al., 2009; Vallerand et al., 2003). However, the authors showed that positive affect was only related to harmonious passion, while obsessive passion was in most studies unrelated to positive affect (Philippe et al., 2010; Vallerand et al., 2006) or even negatively related to it (Mageau et al., 2005), but obsessive passion was positively correlated with negative affect (Philippe et al., 2009; Vallerand et al., 2003). Therefore, we conclude that ‘liking’ as an essential passion component is problematic, and instead we suggest to refer to the intensity of approach motivation rather than to any particular valence of affect. A helpful concept is the distinction between ‘wanting’, which is an approach motivation and ‘liking’, which is a hedonic experience (Berridge, 2007; Berridge et al., 2009). Wanting is characterized by high arousal affect and urging desire (Berridge, 2007; Brehm & Self, 1989). On the contrary to liking, wanting does not necessarily refer to a hedonic tone or positive valence affect: the valence of the experienced affect of such a desire can be positive or negative (Friedman & Förster, 2011, p. 514; Ortony & Turner, 1990, p. 318). Different than liking, wanting implies an intention to approach corresponding goals, and the mental preparation of instrumental behavior for the pursuit of these goals, even despite obstacles (Salamone & Correa, 2002). As a function of the dopamine reward system, wanting is typically rewarded and reinforced after the wanted object is approached (Berridge, 2007; Robinson & Berridge, 2008). That means, the motivation does not just extinct when a goal is reached, but is typically reinforced (or ‘reboosted’, as Berridge, 2007, p. 411 calls it), thus causing a new high motivational intensity at the time of the next stimulus exposure. These implications let the concept of ‘wanting’ be interesting for the research on passion.

To sum it up, a central component of the most definitions of passion is intense approach motivation, which is characterized by high arousal affect and urging desire. Such approach motivation intensity is the only component of our passion definition that is no essential part of classical commitment models. Commitment can be thought without high arousal approach motivation intensity, passion cannot.

*In a nutshell:* Based on former work on passion and commitment and due to commonalities of these concepts we suggest to define passion as the coincidence of commitment with intense approach motivational, characterized by four components: a) continuous intent to engage in the activity, b) identification with the activity, c) goals referring to the activity, and d) intense approach motivational in regard to the activity. The components a, b and c are essential components of classical commitment (see above), however intense approach motivation is a congruent but not necessary correlate of commitment, but an essential component of passion. In our point of view this is the crucial difference between passion and other concepts of commitment. Our proposed passion concept *specifies the relations and interactions* between well-investigated constructs in order to avoid jingle and jangle fallacies. The concept is intended to be a synthesis rather than an alternative to previous definitions. Of course, in a next step our theoretically approach needs to be investigated empirically in order to test its assumptions. This conceptualization has the advantage that it explains the structure of general passion more specifically than other models. This might be useful for future studies on the question if passion makes a difference in people's lives, and if so, which aspects of passion are related to the outcomes. In order to facilitate the distinction and recognition of different concepts of passion in the future, we suggest to call our concept the commitment and passion (short: com.pass) model.

### **Conclusion and Directions for Future Research**

This article provided a comprehensive overview about psychological passion concepts and summarized the related terminological ambiguities. To date, there is neither consensual definition, nor consensual measurement, and evidence for the incremental validity of the passion construct is lacking.

We have pointed out that there are substantial overlaps between psychological passion concepts with classical concepts of commitment. To avoid terminological ambiguities we

suggest to define passion as the coincidence of intense approach motivation and commitment. A corresponding model, the com.pass model, was suggested in this article. Given that commitment is the older and better investigated construct, we claim that the knowledge about commitment provides important insights and inspirations to the research of passion. On the other hand, there are original assumptions and interesting findings within the research of passion that have not yet been applied to commitment research (such as the differentiation between harmonious and obsessive passion and their differential outcomes). Thus, considering the respective other construct promises to be beneficial for each research line. We believe that a potential strength of this synthesis between passion and commitment is the improvement of explanations concerning one important research gap: The motivation to persist in activities despite obstacles and aversive experiences as it can be observed in sustained deliberate practice over years. Finally we would like to point out directions for the future research and central research questions that should be answered before any conclusion about the usefulness of the construct passion can be drawn:

In any case it is important to *overcome* the currently dominating *terminological ambiguities* around the term passion and the inflationary use of the term within psychological publications. We hope that this article helps clarifying the concept of passion. Related with this, there is a need for a consensual measurement and/or for a discussion about strengths and weaknesses of different passion measurements. Different measures for passion have previously been used (compare Fredricks et al., 2010, and Vallerand et al., 2003) and systematic comparisons of measurement instruments are needed in order to prevent jingle fallacies. Alternative measurements could provide a workaround for the current shortcomings of passion measurements, such as the fact that they mostly rely on self-reports and on the mental aggregation across many single experiences. Future studies should take into account the already existing diversity of measurements, may apply alternative measures such as reports by significant others, psycho-physiological measures for affect, Experience Sampling

Method or behavioral measures, and future research approaches should be clear about the reasons for their measurement choice in order to prevent arbitrary uses and jingle fallacies.

The *incremental validity* of the construct passion depends on the answer to the question whether passion can or cannot contribute unique explanations to a research gap. Currently, the incremental validity of passion still has to be demonstrated empirically. In order to decide upon the incremental validity of passion, studies for the systematic comparison of passion with other established constructs of motivational psychology are needed, including empirical studies on similarities and differences between passion and commitment. As a matter of incremental validity, future research should further investigate whether experiencing passion makes a difference in people's life, and if so, which (see Philippe, Vallerand, & Lavigne, 2009). This research question goes beyond the differentiation between harmonious and obsessive passion and concerns the comparison of persons who experience one or more passions with persons who do not. It would be desirable that such future studies also differentiate between different levels of aggregation: passion on the micro-time level tapping moment-to-moment experiences of passion and on a macro-time level tapping the development of passion across weeks or years. Such a specification of what is means to experience a passion would be interesting because it might have different consequences if a person experiences many or few passion-like states in a given time span, if that time span is short or long, and if the single passion-like states refer to one or to multiple activities. Given this matrix of possibilities, future studies should apply more specific and diversified instruments to measure passion. Secondly, there is a need for evidence for the assumption that passion or forms of it indeed predict outstanding or irrational persistence (e.g. in the face of irrationally high costs, obstacles, setbacks or negative consequences). There is evidence that some forms of passion correlate with persistence which -according to the opinion of people who don't share that passion- is irrational, like bicycling in the Canadian winter (Vallerand et al., 2003), taking injury risk among dancers (Rip et al., 2006) or

problematic gambling (Philippe & Vallerand, 2007). However, it is not sure whether indeed irrational decision making processes take place or if such decisions can be described within rational-choice models like for example in terms of Wigfield and Eccles' (1992) task value. In terms of subjective task value, the persistence of an obsessively passionate person could be a subjectively rational decision. More studies are needed in order to figure out how the presumable discrepancy between attracting powers and repelling forces is subjectively experienced.

Furthermore, there is a need for longitudinal studies on the *development of passion*. There are much more studies on the structure than on the development of passion and studies concerning the hypothetical long-term stability of passion (see Vallerand et al., 2006) are generally lacking. Virtually all models of passion concern the structure, and process models are still needed in order to gain more knowledge about predictors, outcomes and the stability of passion. Since most previous longitudinal studies did not assess the change in the variable passion (Amiot et al., 2006; Fredricks et al., 2010; Mageau et al., 2009; Philippe, Vallerand, & Lavigne, 2009; Vallerand et al., 2007; Philippe, Vallerand & Lavigne, 2009; Vallerand, Mageau et al., 2008), this should be considered in future research. There is also a need for longitudinal studies across larger time spans to investigate the assumed long-term effects of passion.

Moreover, for the conceptualization of passion it is necessary to study more specifically the environmental or situational and the personal or dispositional *determinants of passion* and about the possible interactions of both sources of variance. Future research approaches therefore could focus more on the relation of passion to personality traits and to situation-specific characteristics (such as for example challenges, feedback, autonomy support or social support in general). Since passion is conceptualized as a person-activity relationship, the likelihood of developing a passion is probably determined by person-specific and by activity-specific characteristics, and it would be most useful to disentangle these factors.



These questions should guide future research approaches, and we believe that they can only be answered satisfactorily, if clear and – if possible – consensual definitions and measurements of passion are applied. The advancement of passion requires that researchers take into account the ambiguities that were depicted in this article.

**Paper 2: Moeller, J. & Grassinger, R. (in prep.): Measuring passion and commitment with one joint scale: psychometric properties and validity of the com.pass scale. Manuscript in preparation.**

**Abstract**

Passion is a relatively new psychological construct that describes the concurrent experience of commitment and intense approach motivation towards a particular activity. For the assessment of these two components of passion, the ‘com.pass scale’ was developed and tested in four studies ( $N_{\text{total}} = 1083$ ) across different activity contexts and in two countries (Germany and Brazil). The com.pass scale resulted to be a reliable and valid instrument for the assessment of both commitment and passion. The com.pass scale was strongly correlated to the dual model passion scale and the sport commitment scale.

The new scale was used to test central assumptions of both the com.pass model and the dual model of passion. Structural equation models confirmed the assumption that commitment is a component of passion, and person-oriented analysis revealed that the degree rather than the type of passion accounts for group differences. These findings confirm central assumptions of the com.pass model and indicate that the com.pass scale is a useful instrument for the research about passion.

*Keywords:* passion scale, commitment, com.pass model, construct validity, person-oriented analysis, German and Portuguese version

## **Introduction**

„Presumably the intelligent switching between openly responsive affective engagement and taking a less affective and more habitual view constrained by long-term plans, goals, or values is one of the things that our large prefrontal cortex [...] is for. Even so, integrating the demands of love and loyalty, of spontaneity and commitment, is seldom an easy task.” (Katz, 1999, p. 527).

A relatively new psychological construct for the integrating short term motivational intensity and long-term commitment, is the concept of passion for activities. Particularly the new commitment and passion (com.pass) model (Moeller & Grassinger, 2013) disentangles affective responses, long-term goals, and identity components of passion. This article presents a corresponding scale for the assessment and systematic disentanglement of these components. Psychometric properties of different language versions of this scale are reported and the new scale is used to test crucial assumptions of the com.pass model.

## **The Previous Research**

### **Current Concepts and Measures of Passion**

Previously, many different concepts of passion have been discussed in the psychological literature (e.g. Sternberg, 1997; Renzulli et al., 2006; see Moeller & Grassinger, 2013 for an overview). Mostly, the term is used, but not explicitly defined (e.g. Achter & Lubinski, 2005; Amabile & Fisher, 2009; Csikszentmihalyi, 1996; Delcourt, 2003; Gagné, 2007; Hébert & McBee, 2007; Mills, 2003). However, a few explicit psychological passion concepts with corresponding measurement instruments were also proposed (Cardon, Wincent, et al., 2009; Fredricks et al., 2010; Vallerand et al., 2003). Most psychological passion concepts have in common that they describe passion as a persisting inclination of a person toward an activity or topic that is characterized by hedonic, emotionally positive experiences,

strong approach motivation, and aspects of identification and long-term goals (for an overview, see Moeller & Grassinger, 2013).

The most thoroughly investigated psychological passion concept is the dual model of passion from Vallerand and colleagues (2003). In this model, passion is defined as “a strong inclination toward an activity that people like, that they find important, and in which they invest time and energy” (p. 755). The authors claim that a passionate person identifies with the respective activity, and that different forms of identification lead to different types of passion. According to the dual model of passion, the adaptive type ‘harmonious passion’ (HP) results from autonomous, willing internalization of the activity into one’s identity, and the maladaptive type ‘obsessive passion’ (OP) results from controlled, constrained and pressured internalization of an activity into the identity. Numerous studies have used the dual model passion scale suggested by Vallerand et al. (2003) for the investigation of differences between harmonious and obsessive passion. They found that harmonious passion was related to positive and intrinsic experiences, such as flow, positive emotions, well-being, staying in control, deliberate practice and performance (e.g. Bonneville-Roussy et al., 2011; Philippe, Vallerand, & Lavigne, 2009; Vallerand et al., 2003; 2007; Vallerand, Mageau, et al., 2008), whereas obsessive passion is related to maladaptive consequences such as risky and rigid persistence, loss of control, symptoms of dependency, negative emotions, and health risks (e.g. Philippe & Vallerand, 2007; Ratelle et al., 2004; Rip et al., 2006; Vallerand et al., 2003). In these studies, harmonious and obsessive passion are correlated with each other, the corresponding effect size ranges from small (e.g. Marsh et al., 2013) over moderate (e.g. Rip et al., 2006; Vallerand et al., 2007) to high (e.g. Séguin-Lévesque et al., 2003; Vallerand et al., 2006; Vallerand et al., 2003; Vallerand, Ntoumanis, et al., 2008, study 1). Therefore, studies on differences between both types often report partial correlations of one passion type with a criterion, in which the other passion type is controlled (e.g. Rip et al., 2006; Philippe & Vallerand, 2007; Vallerand et al., 2003).

### Shortcomings in the previous research on passion

A problem in the previous research about passion is the unclear relation between the psychological definition and the everyday life concept of passion. Everybody has an idea about what passion means, but this idea might differ from the definitions discussed among researchers. It is often assumed but not tested whether these two concepts of passion refer to the same phenomenon. The dual model passion scale from Vallerand and colleagues (2003) assesses the explicit declaration “this activity is a passion for me” as an indicator of the psychological construct passion. However, it might be that the everyday life term passion differs from the psychological definition of passion, which would impair the validity of this indicator. Given that the item is formulated as a leading question, there might even be a discrepancy between an individuals’ answers to this item and this individuals’ tendency to describe him or herself as passionate in everyday life settings when being asked with less leading questions. Consequently, it is unknown to what extent the answers to this item, the everyday life concept of passion, and the psychological construct con- or diverge. This situation can create ambiguities and confusion, given that many researchers apply more the implicit everyday life term and don’t refer to explicit definitions (for an overview see Moeller & Grassinger, 2013), and given that also non-researchers frequently theorize about the impact of passion on people’s lives, well-being, learning capacity and performance (see for example Burkeman, 2009).

Disregarding the findings of moderate and high correlations between harmonious and obsessive passion, several authors use the dual model passion subscales to divide their sample into the group of mainly harmoniously passionate individuals and the group of mainly obsessively passionate individuals (Philippe, Vallerand, & Lavigne, 2009; Mageau et al., 2009). These studies presuppose homogeneous groups of more harmoniously and more obsessively passionate individuals, but few studies have ever tested whether such groups can be found empirically, and those who did (Wang et al., 2008; Moeller, Keiner et al., in prep.)

found clusters of either highly passionate or lowly passionate individuals instead of clusters of mainly harmonious versus mainly obsessive individuals. The individuals of the high passion cluster had high values in both harmonious and obsessive passion, whereas individuals in the low passion cluster had low values in both subscales. It was very rarely studied whether these groups of highly and lowly passionate individuals differ in relevant experiences and behavior (for comparisons of impassionate individuals with groups of harmoniously and obsessively passionate individuals, see Mageau et al., 2009, and Philippe, Vallerand, & Lavigne, 2009).

Passion is often conceptualized as a multi-faceted construct with short-term and long-term components, affective, cognitive, and behavioral aspects (Cardon, Wincent et al., 2009; Fredricks et al., 2010; Moeller & Grassinger, 2013; Vallerand et al., 2003). However, the specific components of passion are rarely disentangled empirically and it is unknown how exactly these components are involved in the experience of passion and how each component contributes to the prediction of relevant outcomes of passion. Particularly the four general passion criteria of the dual model of passion (liking, finding important, investing time and energy and identifying with the activity; Vallerand et al., 2003) are vague and not optimally operationalized (for a critique see Moeller & Grassinger, 2013). Each of these passion criteria is assessed with only one single item in the dual model passion scale, and this limits the possibility to reliably measure and investigate the role of each component in the experience of passion.

As a remedy for many of the above mentioned research gaps, Moeller and Grassinger (2013) suggested the commitment and passion (com.pass) model as the result of a comprehensive literature review of passion concepts in and beyond psychology. This model bridges the formerly separated research lines concerning passion and commitment (in terms of Rusbult, Martz et al., 1998; Scanlan et al., 1993; Scanlan, Russell, Wilson, & Scanlan 2003), and also integrates the commonalities of different psychological passion concepts (e.g. Cardon, Wincent et al., 2009; Fredricks et al., 2010, Renzulli et al., 2006; Vallerand et al.,

2003) within one model. The authors pointed out that commitment and passion overlap in the three components intentions, identification and long-term goals, and that passion differs from commitment only insofar in that it describes the coincidence of commitment with desire.

Desire is defined as intense approach motivation to engage in the activity, which is typically accompanied by the experience of high arousal affects of any valence and it is related to goal pursuit (Berridge, 2007, Harmon-Jones, Gable, & Price, 2011; Brehm & Self, 1989). The com.pass model emphasizes simultaneously the different components and the general degree of passion. Until now this model could not be tested empirically due to a lack of corresponding measurement instruments for the assessment of these specific components of passion and commitment. The present article wants to change that by presenting a corresponding scale for the assessment of all these components of passion and commitment.

In sum, the previous research has blind spots in

- 1) the lack of studies on the specific components of the multifaceted construct passion,
- 2) the lack of tests for the assumption that commitment is central component of passion,
- 3) the lack of studies on the question whether the general degree of passion or the harmonious and obsessive types of passion account for inter-group differences and
- 4) the lack of tests for the frequent assumption that the everyday life term passion and the psychological concept refer to the same phenomenon.

Moreover, to date there is no instrument for the operationalization of the passion components as defined in the com.pass model. This article proposes solutions to the above depicted problems.

### **The Present Research**

The present paper suggests a new passion scale for the assessment of the passion components specified in the com.pass model. The psychometric item properties, reliability

and validity of a German and Portuguese version of this scale were investigated in a pre-study and three main studies. Also, a non-tested English translation is suggested for future research.

In order to test the validity of the com.pass scale, we investigated its relation to the dual model passion scale (Vallerand et al., 2003) and to the sport commitment scales (Scanlan et al., 2003; 2009). For this purpose, the dual model passion scale was translated into German and Portuguese. The psychometric properties for these new language versions of the dual model passion scale are reported for the first time.

Crucial assumptions of both the com.pass model and the dual model of passion were tested. First, we tested whether the two passion scales measured the same phenomenon, or rather two distinct constructs. For this purpose, a one-factor structural equation model representing the similarity of both scales was tested against a bi-factorial model in which the items of each scale loaded on distinct factors. Second, we tested the assumed similarity of the com.pass subscale 'commitment' with the sport commitment scale. Again, this assumption was tested against a two-factor model. And finally, cluster analyses were computed in order to determine if the general degree of passion accounted for inter-individual differences, as expected by the com.pass model, or if rather the two types of harmonious and obsessive passion differentiated between homogeneous groups of individuals.

### Hypotheses

We expected satisfactory psychometric properties (reliability, discriminatory power, skewness, and kurtosis) for the items of the com.pass scale, and for the other applied passion and commitment measures. Regarding the construct validity, we expected high correlations between the com.pass scale and other measures of passion and commitment, such as the dual model passion scale from Vallerand and colleagues (2003) and the sport commitment scale (Scanlan et al., 1993; 2003; Sousa, Torregrosa, Viladrich, Villamarín, & Cruz, 2007; Sousa, Viladrich, Gouveia, Torregrosa, Cruz, 2008). Regarding the incremental validity, we expected that passion substantially improved the explanation of relevant criteria such as deliberate



practice beyond the variance that is explained by the construct of sport commitment.

Regarding the factorial validity of the com.pass scale, we expected the items to fit to a five factor solution, with one factor for each of the four subscales and a higher order factor ‘commitment’, loading on the subscales intent, identification, and long-term goals and being correlated with the fourth subscale desire (see Figure 1).

Furthermore, as exploratory research question we investigated whether the type of passion (harmonious versus obsessive) accounted for differences between homogeneous groups of individuals (as stated in the dual model of passion by Vallerand and colleagues, 2003), or if instead the general degree of passion (high versus low) distinguished between such clusters (as emphasized in the com.pass model by Moeller & Grassinger, 2013).

#### The com.pass scale

The com.pass scale was developed as an instrument for the assessment of all passion components specified in Moeller and Grassingers’ (2013) commitment and passion (com.pass) model. Correspondingly, the com.pass scale assesses four components of passion: 1) the continuous intent to engage in an activity, 2) identification with the activity, 3) long-term goals referring to the activity and 4) desire. The components 1, 2 and 3 together form the subscale commitment, and the passion score is computed as the average of the subscales commitment and desire.

The com.pass scale is a self-report questionnaire. The final version consists of 31 items. A German and Portuguese version were developed and tested. The corresponding item sets and psychometric properties are documented in the appendix. An English item set was developed but not yet tested, and the respective item formulation is also documented in the appendix.

A preliminary item set was tested in a pre-study (N = 60), after which some items were changed, excluded, or added in order to optimize the reliability and comprehensibility of the scale. The resulting final version of the scale was investigated in three main studies, which

focused on psychometric properties of the items, the structure of passion, and the relations of the passion score to external validity criteria.

### **Methods**

A pre-study and three main studies were conducted in order to test the hypotheses. Table 45 gives an overview about research questions, instruments and samples of these studies. In the following, we first describe the studies and applied measures. Afterwards, the results of the three main studies are summarized and compared in the ‘results’ section in order to provide an overview about similarities and differences in the findings.

Table 4

*Studies & Samples*

Study	Research Question	Sample & assessment	N	Instruments
Pre-study	Testing 1st Version of new passion scale	Students at schools	60	com.pass scale, declarative passion scale
Study 1	Testing of new items, psychometric properties & validity of the new passion scale, CFA, Cluster Analysis	Undergraduate students (Universities of Erfurt and Augsburg), paper-&-pencil questionnaires	471	com.pass scale, dual model passion scale, declarative passion scale
Study 2	Replication of study 2, Relations of two passion scales to commitment, CFA	Adolescents in two private schools in Rio de Janeiro	274	com.pass scale, dual model passion scale, sport commitment scale
Study 3	Replication of study 1, Relations of passion to sport commitment, CFA, testing of additional items	Adolescent soccer player, online survey and paper-&-pencil questionnaires	278	com.pass scale, dual model passion scale, sport commitment scale, engagement and performance indicators

Note. Instruments: <sup>a</sup>= com.pass scale, <sup>b</sup> = Dual Model Passion Scale (Vallerand et al., 2003), c) Sport Commitment Scale (Sousa et al., 2008).

## Pre-study: Purpose, Procedure, and Measures

*Purpose*

A pre-study was conducted in order to test the first item set of the newly developed com.pass scale. The objective was to determine the psychometric properties of all items and to replace items with problematic values.

### *Participants and procedure*

For this purpose, 60 students of the seventh to tenth grade were surveyed in their school class (aged from 13 to 18 years, mean age = 15.7, 38.3% female). The data collection took place in two schools (one class of seventh graders and two classes of tenth graders) in the federal state of Thuringia, in Germany. The participants filled out paper and pencil questionnaires. They were asked to name their three most important favorite activities in a first step, to rank them afterwards in the order of their importance, and to respond all questions in regard to the first, most important favorite activity. This selection and ranking procedure was used in order to determine the consciously most important, not just most salient activity.

### *Measures*

The questionnaire included the first item set of the com.pass scale and additionally a question concerning the labeling of the relevant activity ('declarative passion').

The first item set of the com.pass scale comprised 42 items which were assigned to four subscales: 1) continuous intent to engage, 2) identification, 3) long-term goals and 4) motivational intensity. All scales were assessed on a 6-point response scale from 1 = *do not agree at all* to 6 = *very strongly agree*. The com.pass scale distinguishes between commitment and passion. The commitment subscale is computed as the mean value of the three subscales intent, identification and long-term goals. The passion measure is computed as the mean value of the subscales commitment and motivational intensity.

The "declarative passion" scale was developed in order to investigate overlaps and differences between the everyday life concept of passion and the psychological construct. For this purpose we assessed additionally whether participants labeled their favorite activity explicitly as a passion, and how this was linked to the com.pass scale. The scale was placed at the end of the questionnaire. In order to avoid suggestion, the target label passion was presented among nine "distraction labels": The participants were asked to tell if their most

important favorite activity was a) a hobby, b) a life task, c) an ardor, d) a passion, e) a preference, f) a calling, g) a concern of the heart, h) a strong interest, i) a love, and / or j) a favorite activity. The response scale was dichotomous with the options “true” and “not true” and multiple affirmative answers for these labels were allowed.

### Study 1: Purpose, Procedure, and Measures

#### *Purpose*

The first main study investigated the psychometric properties and validity of the final com.pass scale item set. Particularly the concurrent and factorial validity were focused in this study. In order to determine the concurrent validity, we also translated the dual model passion scale from Vallerand et al. (2003) for this study into German (for the psychometric properties of all items, see Table 23, Table 24, and Table 26). Moreover, it was investigated which measures of passion accounted for differences between homogeneous groups of individuals in a person-oriented analysis.

#### *Participants and procedure*

In total 471 undergraduate students from the German Universities of Erfurt ( $N_{\text{subsample1}} = 353$ ) and Augsburg ( $N_{\text{subsample2}} = 118$ ) filled out questionnaires in class. As in the pre-study, participants were instructed to name their three favorite activities, to rank these activities according to their importance for themselves and to answer to all following questions in regard to the first ranked activity. Four participants were excluded from further analyses for not naming any activity. The remaining 471 students were on average 23.43 years old ( $SD = 3.05$ ). 67.0% were female. All participants studied psychology or a pedagogic major subject.

#### *Measures*

All constructs were measured with self-report questionnaires in German language. Passion was measured with three instruments: our com.pass scale, the dual model passion

scale from Vallerand et al. (2003) and the measure for declarative passion that had been used in the pre-study.

The com.pass scale comprised 21 items that belonged to the four subscales ‘continuous intent to engage’ (six items), ‘identification’ (six items), ‘long-term goals’ (five items), and ‘desire’ (four items; see the appendix for item wordings, and psychometric properties). All items were answered on a 6-point scale with a range from 1 = *do not agree at all* to 6 = *very strongly agree*. As in the pre-study, the commitment subscale was computed as the mean value of the subscales intent, identification and long-term goals, and the passion score of the com.pass scale was computed as the mean value of the subscales commitment and desire.

A subsample of N = 353 (all participants from the University of Erfurt) also responded to the dual model passion scale from Vallerand et al. (2003). This scale consists of 18 items of which four items are general passion criteria, seven items are indicators for harmonious passion (HP) and seven items are indicators of obsessive passion (OP). The four passion criteria are liking, finding important, spending time and energy and labeling the activity as one’s passion. An example item for the harmonious passion subscale is “This activity is in harmony with the other activities in my life” and an example item of the obsessive passion subscale is “I have difficulties controlling my urge to do my activity”. The response scale ranged from 1 - do not agree at all to 7 - very strongly agree. The German version of this scale was obtained via forth- and backwards translation and subsequent discussion by the authors.

Declarative passion was assessed with the same items as in the pre-study (see above) in a subsample of N = 224 participants.

In order to give a better overview about the findings in the different studies one, two, and three, the results of all studies are reported in the ‘synopsis’ section. The results are documented in the ‘results’ section and the appendix in Table 6 to Table 26. We continue with the description of the other studies that were included in the article and report the results

of all three studies below these descriptions, so that the findings of the three studies can be compared with each other easily.

### Study 2: Purpose, Procedure, and Measures

#### *Purpose*

A second study was conducted in order to replicate the findings of study 1 and to investigate the validity of the com.pass scale with regard to commitment.

#### *Participants and procedure*

A total of 274 Brazilian private school students of two affiliate institutions were recruited in Rio de Janeiro in August 2012. The participants were on average 17.31 years old, 53.7% were female. The schools in which the data collection took place were two affiliations of the private school “Intellectus” in the districts Méier and Catete in Rio de Janeiro. The participants attended the ninth grade (10.6%), tenth grade (26.3%), eleventh grade (25.9%) or courses in preparation for the university entrance exams<sup>8</sup> (37.2%). The students were surveyed in classes. They were instructed to write down their three favorite activities, then to rank these activities according to their importance for the student and to answer all questions in regard to the first, most important activity. This procedure was the same as in the pre-study and study 1.

#### *Measures*

*Measures of passion.* In this study, we used Portuguese versions of the previously described two passion scales (the com.pass scale and the passion scale from Vallerand, et al., 2003; see study one) and the Portuguese version of the sport commitment scale (Sousa et al., 2007; 2008). The two passion scales were translated into Portuguese by two independent Brazilian translators (one junior and one senior lawyer, both fluent in English with TOEFL

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<sup>8</sup> The corresponding Brazilian labels for these grades are “primeiro, segundo e terceiro ano do segundo grau” and “pre-vestibular”.

scores > 100 and German skills above level A2 of the European reference frame for languages). The translators were presented with two equivalent versions of both passion scales (a German version and an English version) and they were asked to translate the scale into Portuguese. The first author then translated the scales back into German and discussed ambiguous translations with the translators in order to find the most equivalent Portuguese expression.

*Commitment* was measured with the commitment subscale of the Sport Commitment Questionnaire (SCQ; Scanlan et al., 1993; 2003). For this study, we used the Portuguese version of this scale (Sousa et al., 2007; 2008), which according to the translators did not require language changes for being applied in Brazil. The SCQ consists of six subscales, one for the assessment of sport commitment as such and five subscales for the assessment of predictors of sport commitment. Since we were not interested in the predictors, we only used the sport commitment subscale. This scale consists of 6 items all of which concern the commitment towards the relevant activity, for example the Portuguese translation of the item “I am determined to play soccer in the next season”. The response scale ranges from 1 = *not at all* to 5 = *very much*. In order to assess the commitment towards the individuals’ favorite activities, the items were adapted to refer to general activities.

The results are documented and compared with those of the other studies in the ‘results’ section and in the appendix in Table 6 to Table 26.

### Study 3: Purpose, Procedure, and Measures

#### *Purpose*

Finally, a third study was conducted in order to replicate the previous findings in regard to the relation of passion to commitment. This time, the functioning of the scale was tested in a homogeneous sample of individuals who were all engaged in the same competitive



activity: soccer. Additionally to the passion and sport commitment scales, indicators of deliberate practice and performance in soccer were assessed in order to investigate the incremental validity of passion over commitment in the explanation of these criteria. In order to improve the reliability and factorial validity of the com.pass scale, ten additional items were tested (four for the subscale ‘continuous intent to engage’, one for the subscale ‘identification’, one for the subscale ‘long-term goals’ and four for the subscale ‘desire’).

### *Participants and procedure*

278 adolescent soccer players in the German federal state of Thuringia were surveyed. They were on average 14.87 years old (ranging from 11 to 19 years). 99.1% were male. The study was conducted in two steps. First, links to the online survey were sent via mass e-mail to all soccer clubs in the German Federal state Thuringia by the Thuringian Soccer Association (Thüringer Fußball-Verband, TFV). Together with that e-mail, the clubs also received flyers and posters for the announcement of the study. All trainers were asked to announce the study with the help of these materials and to motivate all youth soccer players of the age classes A (13-14 years), B (15-16 years), and C (17-18 years) for participation in the study. 48 individuals filled out the online questionnaires, two of them were excluded from further analyses because they were much older (> 27 years) than the target sample.

In order to achieve a larger sample size, we then contacted all soccer clubs with competitive youth teams via telephone and e-mail for survey appointments. 17 Thuringian soccer clubs were then visited, and 234 participants filled out paper and pencil questionnaires during their soccer training lessons.

### *Measures*

*Passion.* As in the studies one and two, passion was measured with the com.pass scale, to which ten new items were added; and with the dual model passion scale (Vallerand et al. (2003).

*Sport Commitment.* As in study two, sport commitment was assessed with the sport commitment scale (Scanlan et al., 1993). Because the latest publication of this scale was the Portuguese scale version from Sousa et al. (2008), we translated the scale from Portuguese into German. The item wording was adapted to the activity ‚soccer‘.

*Engagement and deliberate practice.* As indicators of deliberate practice and engagement in soccer, we adapted some of the items suggested by Charness, Tuffiash, Krampe, Reingold, & Vasyukova (2005). We assessed how much time per week the participants played soccer, how many years they had played soccer, how many years they had practiced soccer seriously, and how many years they had been members of a soccer club.

*Performance.* In order to identify soccer-relevant performance indicators, we asked expert talent coaches of the Thuringian Soccer Association about valid and consciously accessible aspects of juvenile soccer performance. The soccer performance was assessed with single items regarding the league the participants played in, if they were starter or substitute, if they had been selected for a representative team at present or in the past, and if so, for which.

*Vocational aspiration.* As indicator for soccer aspirations, if they wanted to become a professional soccer player in the future (response options were 1 = *no, not at all*, 2 = *maybe*, 3 = *yes, absolutely*). The participant’s position (e.g. as sweeper or back) was assessed as well.

The results are documented in the following section and the appendix in Table 6 to Table 26.

## **Results**

This section gives an overview about the results of the pre-study and the three main studies.

### Results of the Pre-study: Reliability and Validity of the Preliminary Item Set of the Com.pass Scale

The psychometric properties (reliability, discriminatory power, skewness, curtosis) were computed for all items and subscales of the preliminary com.pass scale. In order to improve the preliminary item set, items were discarded if this a) enhanced the internal consistency of the corresponding subscale, b) improved the comprehensibility of the questionnaire, c) reduced redundancy, d) was necessary in order to achieve uni-dimensional subscales. In total, 28 items were discarded because of one of these reasons. Table 5 gives an overview about the mean value, standard deviation, reliability and inter-correlations of the remaining items. To the revised item set, four new or reformulated items were added. The resulting final version comprised 21 items and the four subscales. This item set of the com.pass scale was applied in all following studies (see appendix).

A first indicator for the validity of this preliminary item set was the fact that the com.pass passion score was significantly correlated with the individuals' declaration that the favorite activity was a passion. The effect size was moderate ( $r = .36$ ).

Table 5  
*Descriptive analyses, reliability and convergent validity for selected item of the preliminary version of the com.pass scale in the pre-study (N = 60 German adolescents)*

	<i>No. of items</i>	<i>M (SD)</i>	<i>α</i>	<i>Correlations</i>					
				<i>1</i>	<i>2</i>	<i>3</i>	<i>4</i>	<i>5</i>	<i>6</i>
1. Intent (com.pass)	5	4.21 (.874)	.73	-	.56*	.47*	.39*	.39* <sup>a</sup>	.15
2. Identification (com.pass)	5	3.68 (1.171)	.80		-	.57*	.57*	.72* <sup>a</sup>	.27*
3. Long-term goals (com.pass)	3	4.19 (1.127)	.84			-	.42*	.57* <sup>a</sup>	.15
4. Desire (com.pass)	3	4.57 (.955)	.57				-	.56* <sup>a</sup>	.40*
5. Passion (com.pass)	31	4.30 (.811)	.72					-	.36*
6. Declarative passion	1	0.70 (0.462)	-						-

Note. N = 60, <sup>a</sup> = part-whole corrected; \* = significant ( $p < .05$ , one-tailed).

### Types of Passionate Activities in the Pre-study and the Studies One and Two

In the pre-study and the studies one and two, the participants were asked to name their three most favorite activities and to rank them afterwards in the order of their personal importance. The activities were categorized and counted. Table 6 depicts the categories and the percentage frequency of their nomination.

Sports and social activities were among the most often mentioned first rank favorite activities in all these studies. Among the adolescents in the pre-study and study two, digital media (computer, TV, social networks, cinema) were often mentioned as first rank favorite activities (15.0% and 18.5%, respectively), whereas digital media were less important (3.6%) among the undergraduate students of study one. In study one, social activities were the most frequently mentioned first rank activities and almost as often a declared passion, whereas in contrast they were mentioned less frequently as first rank activities or declared passion in the pre-study and the second study. This finding might be due to the selected sample of study one, which comprised only participants with 'social' majors (psychology or pedagogics). In the pre-study, 70.1% of all participants declared that their favorite activity was a passion for them. In study one, this was declared by 81.2%.

Table 6

*Types of favorite activities and their frequency of nomination*

Category of activity	% rank 1 activity			% rank 1 activity and activity is a declared passion		% rank 1 activity and above-average com.pass passion score			% rank 2 activity			% rank 3 activity		
	PS	S1	S2	PS	S1	PS	S1	S2	PS	S1	S2	PS	S1	S2
Sport	35.0	24.2	40.2	30.0	18.3	21.7	15.4	23.0	26.7	26.2	25.3	31.7	25.3	18.5
Music	16.7	11.5	8.9	15.0	11.2	11.7	8.8	5.5	16.7	8.7	8.4	5.0	8.1	6.7
Digital media	15.0	3.6	18.5	10.0	0.9	5.0	0.6	6.2	15.0	6.7	23.8	30.0	10.2	23.7
Social activities	13.3	31.4	10.7	5.0	29.5	3.3	16.1	4.4	25.0	16.7	14.7	8.3	10.2	21.5
Reading / writing	5.0	12.3	8.9	3.3	7.6	1.7	5.6	6.2	5.0	15.8	10.6	5.0	15.7	9.6
Outdoor activities	3.3	2.3	0.0	1.7	0.4	3.3	1.9	0.0	1.7	2.8	2.6	1.7	2.8	1.9
Design /drawing	3.3	3.2	0.4	1.7	3.1	0.0	1.9	0.4	0.0	3.7	0.7	3.3	3.5	1.1
Parties	0.0	0.0	0.7	0.0	0.0	0.0	0.0	0.7	3.3	1.3	1.5	3.3	1.7	0.4
Studying	1.7	1.5	4.8	1.7	2.2	1.7	1.3	2.2	1.7	1.5	5.9	3.3	1.3	8.5
Shopping	0.0	1.1	0.0	0.0	0.4	0.0	0.4	0.0	0.0	1.5	0.0	3.3	1.1	0.0
Cooking	0.0	1.5	0.0	0.0	0.4	0.0	0.4	0.0	0.0	4.8	0.0	0.0	5.7	0.0
Travelling	0.0	2.8	1.1	0.0	1.8	0.0	1.5	0.7	0.0	2.6	2.6	0.0	3.5	3.0
Religion	0.0	0.4	1.1	0.0	0.4	0.0	0.4	1.1	0.0	0.2	2.2	0.0	0.2	0.0
Theater	0.0	0.2	1.8	0.0	0.0	0.0	0.0	1.8	0.0	0.0	0.0	0.0	0.2	0.0
other activities	6.7	4.6	2.9	1.7	5.0	1.6	2.2	1.4	4.9	7.5	1.7	5.1	11.6	5.1

Note. PS = pre-study ( $N_{PS} = 60$  German secondary school students); S1 = Study 1 ( $N1 = 471$  German undergraduate students); S2 = Study 2 ( $N2 = 248$  Brazilian private school students); The numbers indicate the percentage of participants who mentioned these activities as most important, second most important and third most important activities. The second column shows to which percentage these activities were mentioned as first important activities *and* labeled as a passion in the declarative passion scale. The third column reports the percentage of participants that mentioned the respective activities as first rank favorite activity *and* had above average com.pass passion scores for these activities.

## Reliability of the Applied Measures of Passion and Commitment

*Reliability and Inter-correlations of Com.pass Subscales in the Studies One to Three*

After the first item testing and selection in the pre-study, the second item set of the com.pass scale was applied in the three main studies of this article. In study three, additional items were added to the scale in order to improve its psychometric properties, particularly those of the previously problematic subscale ‘desire’. Descriptives and internal consistencies for the second and the final scale version are reported in Table 7.

Table 7

*Descriptives and reliability of the applied passion and commitment measures*

	<i>M (SD)</i>				<i>Cronbach's <math>\alpha</math></i>			
	S1	S2	S3	S3 <sub>n</sub>	S1	S2	S3	S3 <sub>n</sub>
1. Intent (com.pass)	4.56 (.790)	4.53 (.832)	4.65 (.829)	4.59 (.807)	.78	.69	.79	.88
2. Identification (com.pass)	3.97 (1.129)	4.21 (1.089)	4.55 (.900)	4.64 (.943)	.87	.80	.85	.86
3. Long-term goals (com.pass)	4.41 (1.004)	4.28 (1.076)	4.61 (.964)	4.65 (.853)	.87	.78	.87	.89
4. Desire (com.pass)	4.59 (.873)	4.92 (.898)	5.01 (.715)	4.85 (.695)	.69	.61	.69	.84
5. Passion (com.pass)	4.45 (.734)	4.63 (.745)	4.81 (.703)	4.74 (.715)	.66	.69	.80	.89
6. Passion criteria (DM)	5.95 (.722)	5.74 (.905)	6.13 (.876)	-	.59	.50	.85	-
7. Harmonious Passion (DM)	5.15 (.849)	5.55 (1.010)	5.48 (.978)	-	.73	.69	.89	-
8. Obsessive Passion (DM)	3.70 (1.266)	4.33 (1.500)	4.34 (1.540)	-	.85	.87	.93	-
9. Sport Commitment	-	4.24 (.595)	4.22 (.699)	-	-	.74	.83	-

Note. S1 = Study 1 (N1 = 471 German undergraduate students); S2 = Study 2 (N2 = 248 Brazilian private school students); S3 = Study 3 (N3 = 278 German leisure soccer player); S3<sub>n</sub> = new item set of the com.pass scale, tested in Study 3. DM = Dual Model of Passion (Vallerand et al., 2003)

*Reliability of the com.pass scale*

In all studies, the com.pass subscales reflecting commitment components (intent, identification and long-term goals) were satisfyingly reliable. In contrast, the internal consistency of the subscale desire was not satisfying in the pre-study and the three main studies. Only the new items added in study three improved the reliability of the com.pass subscales a lot. Particularly strong and important was the improvement of the subscale desire. With the new items, all com.pass subscales were satisfyingly reliable ( $\alpha \geq .84$ ).

The commitment subscale of the com.pass scale was sufficiently reliable in all studies ( $\alpha \geq .71$ ). The overall passion score, which is computed of the two subscales commitment and desire, has a relatively low internal consistency in the first and second study. This however was expected and acceptable because commitment and desire are theoretically distinct experiences: The com.pass model does not assume that commitment and desire always coincide, it rather claims that only the experiences in which these two components coincide are per definitionem passionate, and this is compatible with the found internal consistency.

*Reliability of the dual model scale*

In the first study, the HP and OP subscales were reliable ( $\alpha \geq .73$ ), but the general passion criteria subscale was not ( $\alpha = .59$ ). In the second study, the internal consistency was satisfying for the OP subscale ( $\alpha = .87$ ) and acceptable for the HP subscale ( $\alpha = .69$ ), but again the internal consistency of the four passion criteria from Vallerand et al. (2003) was unsatisfying ( $\alpha = .50$ ) due to a mismatching of the item "I spend much time with this activity". This is an interesting result because it indicates that in this population the time spent with the activity does not correspond to the level of liking the activity, finding the activity important, and labeling the activity as a passion. A post hoc explanation for this finding is regards the busy schedule of these adolescents in study two, who spend much time studying for the final exams, which in many cases are decisive for the adolescents' chance to study and

to improve their living standard. In the third study, the internal consistencies of all dual model passion subscales were satisfying ( $\alpha \geq .85$ ).

#### *Reliability of the sport commitment scale*

The internal consistency of the sport commitment scale was satisfying in the two studies in which it was applied ( $\alpha \geq .74$ ).

### Validity of the Applied Measures of Passion and Commitment

#### *Intercorrelations of the com.pass subscales*

In all studies, the subscales of the com.pass scale are significantly positively correlated with each other and they are strongly correlated with the passion score. Particularly with the new items in study three, the inter-correlations of all com.pass subscales were high.



Table 8

*Intercorrelations of the com.pass subscales*

	Identification				Long-term goals				Desire				Passion <sup>a</sup>			
	S1	S2	S3	S3n	S1	S2	S3	S3n	S1	S2	S3	S3n	S1	S2	S3	S3n
1. Intent (com.pass)	.47*	.43*	.68*	.76*	.59*	.51*	.81*	.82*	.33*	.42*	.62*	.81*	.58*	.56*	.79*	.87*
2. Identification (com.pass)	-	-	-	-	.61*	.46*	.77*	.79*	.51*	.47*	.62*	.76*	.67*	.57*	.77*	.83*
3. Long-term goals (com.pass)					-	-	-	-	.40*	.40*	.62*	.72*	.68*	.55*	.81*	.83*
4. Desire (com.pass)									-	-	-	-	.50*	.53*	.68*	.82*

Note. S1 = Study 1 (N1 = 471 German undergraduate students); S2 = Study 2 (N2 = 248 Brazilian private school students); S3 = Study 3 (N3 = 278 German leisure soccer player); S3n = new item set of the com.pass scale, tested in Study 3; \* = significant ( $p < .05$ , one-tailed); <sup>a</sup> = all correlations regarding the overall passion score are part-whole corrected.

*Construct Validity of Different Passion and Commitment Measures in the Studies One to Three*

The construct validity of the com.pass scale was tested by examining the correlations of the com.pass scale with other measures of passion and commitment.

*Construct validity of the com.pass scale*

The construct validity of the com.pass scale is substantiated by the finding that, as expected, it was significantly positively correlated with all other measures of passion and sport commitment (see Table 9), and with indicators of engagement, deliberate practice, and aspiration to become a professional soccer player (see Table 12). The correlation of the com.pass passion score with the general passion criteria of the dual model passion scale, the harmonious passion subscale and the sport commitment scale are strong in all studies. The correlation between the com.pass passion score and the obsessive passion subscale was medium-sized in study one, but strong in the other studies. In the pre-study and in study one, the com.pass passion score was significantly but weakly correlated with the explicit declaration that the first ranked activity was a passion for the respondent (see Table 9), which was due to the links between the com.pass subscales identification and desire to the declarative passion measure.

*Construct validity of the dual model passion scale*

The construct validity of the dual model passion scale had already been confirmed in many previous studies (e.g. Vallerand et al., 2003; Marsh et al., 2013). It was also corroborated in our studies by the findings that all subscales of the dual model passion scale were medium-sized or strongly correlated with the com.pass passion score and the sport commitment scale. Only the finding that declarative passion was not correlated with any of the dual model passion subscales (see Table 10) was surprising, especially because the

passion criteria subscale of this measure implies the similar item “this activity is a passion for me”.

*Construct validity of the declarative passion scale*

In the pre-study, labeling the activity as a passion was correlated significantly with labeling the activity as a “love” ( $r = .28$ ), but uncorrelated with all other labels of the “declarative passion scale”. This finding might be due to the small sample size in the pre-study, considering that in study one declarative passion was significantly positively correlated with several other distractor items of the declarative passion scale, namely with the declaration that the first rank favorite activity was a hobby ( $r = .22$ ), an ardor ( $r = .36$ ), preference ( $r = .44$ ), concern of the heart ( $r = .29$ ), strong interest ( $r = .16$ ), love ( $r = .22$ ) and favorite activity ( $r = .25$ ). Only the distractor items life task and calling were unrelated to declarative passion in study one.

*Construct validity of the sport commitment scale*

The construct validity of the sport commitment scale was corroborated by the findings of its high correlations with the com.pass scale, the dual model passion scale and in study three with indicators of soccer engagement (see Table 9, Table 10 and Table 12).

These findings confirm crucial assumptions of Moeller and Grassinger’s (2013) com.pass model, according to which commitment is a central component of passion. Table 9 documents the correlations of the com.pass scale and its subscales with the dual model passion scale, the sport commitment scale, and the declarative passion target item. Table 10 depicts correlations among the dual model subscales, the sport commitment scale, and the declarative passion item.

Table 9

*Construct validity of the com.pass subscales*

<i>Com.pass (sub)scale</i>	Passion criteria (DM)				HP (DM)				OP (DM)				Sport Commitment			DP
	S1	S2	S3	S3n	S1	S2	S3	S3n	S1	S2	S3	S3n	S2	S3	S3n	S1
1. Intent	.47*	.54*	.65*	.68*	.48*	.22*	.71*	.79*	.47*	.54*	.58*	.63*	.52*	.59*	.61*	.02
2. Identification	.56*	.54*	.63*	.66*	.43*	.42*	.76*	.77*	.40*	.43*	.57*	.58*	.48*	.59*	.62*	.16*
3. Long-term goals	.55*	.48*	.68*	.69*	.60*	.44*	.72*	.74*	.53*	.50*	.58*	.59*	.58*	.64*	.64*	.09
4. Desire	.40*	.52*	.52*	.66*	.35*	.49*	.63*	.77*	.12*	.43*	.33*	.54*	.55*	.41*	.55*	.22*
5. Passion	.60*	.66*	.68*	.73*	.55*	.55*	.79*	.84*	.38*	.58*	.54*	.63*	.69*	.60*	.65*	.19*

Note. DM = Dual Model of Passion; HP = Harmonious Passion; OP = Obsessive Passion; DP = Declarative Passion; S1 = Study 1 (N1 = 471 German undergraduate students);

S2 = Study 2 (N2 = 248 Brazilian private school students); S3 = Study 3 (N3 = 278 German leisure soccer player); S3n = new item set of the com.pass scale, tested in Study 3; \*

= significant ( $p < .05$ , one-tailed).

*The concurrent validity of the com.pass scale* was good as indicated by its high correlations with the passion criteria of the dual model passion scale in all three studies ( $r \geq .60$ ). The com.pass scale is strongly correlated with harmonious passion, and moderately to strongly correlated with obsessive passion in all three studies. The first study assessed declarative passion as additional criterion for the convergent validity, and the com.pass passion score was significantly but weakly correlated with this item ( $r = .19$ ).

*The convergent validity of the com.pass scale* was confirmed in the studies two and three by the finding that the com.pass passion scale was strongly correlated with the sport commitment scale ( $r \geq .60$ ). As expected, this link was stronger for the commitment subscale (S2: .66; S3:  $r = .66$ ) than for the subscale desire (S2:  $r = .47$ ; S3:  $r = .41$ ). Further support for the convergent validity of these two subscales of the com.pass scale and the passion score of the same scale is discussed below (see also Table 18, Table 19, and Table 20).

*Inter-correlations between the dual model passion subscales, the sport commitment scale and the declarative passion target item* were computed in order to check the construct validity of these measures and in order to confirm the assumed link between passion and commitment with a second passion measure (see Table 10). As expected, the three dual model passion subscales were strongly correlated with sport commitment in the two studies in which this relation was investigated ( $r \geq .55$ ). We found that Harmonious and obsessive passion were moderately correlated in study two and strongly correlated in the studies one and three. This is in line with previous findings (e.g. Mageau, et al., 2009; Rousseau & Vallerand, 2008; Vallerand, Ntoumanis, et al., 2008; Wang & Yang, 2008), although some previous studies have reported much lower effect sizes for this correlation (Marsh et al., 2013; Rip et al., 2012; Vallerand, Paquet, Philippe, & Charest, 2010).

Table 10

*Inter-correlations of the dual model passion scale, the sport commitment scale and declarative passion*

	Harmonious			Obsessive			Sport		DP
	Passion (HP)			Passion (OP)			Commitment		
	S1	S2	S3	S1	S2	S3	S2	S3	S1
Passion Criteria	.48*	.49*	.71*	.48*	.64*	.55*	.54*	.73*	.10
HP	-	-	-	.49*	.38*	.70*	.45*	.63*	.00
OP				-	-	-	.50*	.55*	.15

Note. DP = Declarative Passion; S1 = Study 1 (N1 = 471 German undergraduate students); S2 = Study 2 (N2 = 248 Brazilian private school students); S3 = Study 3 (N3 = 278 German leisure soccer player); \* = significant ( $p < .05$ , one-tailed).

*Descriptives and inter-correlations of indicators of deliberate practice.* In study three we had assessed several indicators of deliberate practice and soccer performance. Of all practice and performance indicators, the years of soccer play, of serious practice and club membership, the time spent with soccer per week, and the vocational goal to become a professional soccer player were significantly correlated with passion and commitment measures. Therefore, only the results concerning these items are relevant for this article and reported in the following. The correlation pattern and effect sizes were the same for the three long-term engagement items (years of play, years of serious practice and years of club membership). Therefore, only the results concerning the first of these long-term engagement items (years of soccer practice) are reported in the following. Table 11 shows that these items were independent of each other.

Table 11

*Descriptives and inter-correlations of the deliberate practice indicators in sample 3 (German adolescent soccer players; N = 278)*

	Central tendency <sup>a</sup>	Correlations	
		Years of soccer practice	Vocational goal: Becoming 'prof. soccer player' <sup>b</sup>
Weekly soccer practice	5.16 (3.098)	-.029	.094
Years of soccer practice	9.55 (3.425)	-	.105
Vocational goal: becoming a professional soccer player	"No, surely not" (46.4 %)		-

Note. N = 278; a = as measure of the central tendency, the mean and standard deviation is reported for the first and second item, which were interval-scaled. Since the third item was ordinal scaled, the most frequent answer (modus) and its frequency were reported as measure of the central tendency. <sup>b</sup> = Spearman correlation because of ordinal scaled item; none of the correlations were significant at .05 level.

### *The Incremental Validity of Passion over Commitment*

The incremental validity of passion over commitment was investigated in study three. Since both passion and sport commitment are supposed to be predictors of deliberate practice (see Moeller & Grassinger, 2013), the above described indicators of deliberate practice in soccer (see Table 11) were used as criteria for the analysis.

Of these indicators, the weekly time spent with soccer and the goal to become a professional soccer player were significantly positively correlated with the com.pass passion score, all dual model passion subscales and the sport commitment scale. Years of soccer practice were correlated with the com.pass passion score (due to its subscales long-term goals and desire), but neither to the passion criteria nor the harmonious passion subscale of the dual model passion scale, nor to the sport commitment scale, which is a noteworthy indicator of the incremental validity of the com.pass scale over the other measures of passion and commitment. Obsessive passion is negatively correlated to years of practice.

Table 12

*Correlations of passion and commitment measures with deliberate practice indicators in sample 3 (German adolescent soccer players; N = 278)*

	<i>Correlations</i>		
	Time spent with soccer per week	Years practiced soccer	Vocational goal: 'professional soccer player' <sup>a</sup>
1. Intent (com.pass)	.29*	.04	.21*
2. Identification (com.pass)	.24*	.10	.29*
3. Long-term goals (com.pass)	.25*	.11*	.35*
4. Desire (com.pass)	.21*	.19*	.14*
5. Passion (com.pass)	.27*	.15*	.26*
6. Passion criteria (DM)	.21*	.04	.33*
7. Harmonious Passion (DM)	.29*	.01	.34*
8. Obsessive Passion (DM)	.29*	-.20*	.35*
9. Sport Commitment	.25*	-.05	.20*

Note. N = 278; <sup>a</sup> = Spearman correlation because of ordinal scaled item; \* = significant ( $p < .05$ , one-tailed); the here reported results correspond to the old item set of the com.pass scale as used in the studies 1 and 2.

In order to investigate whether passion had incremental validity over commitment in the explanation of weekly soccer practice, we conducted a hierarchical regression analysis with commitment as predictor in the first step and commitment and passion as predictors in the second step. We summarized the passion measures to one 'passion factor', because of the high correlations between all passion measures and because we found in the cluster analyses (see below) that individuals were either highly passionate with high scores in all measures of passion, or lowly passionate with low scores in all passion measures (see Figure 4). For this purpose, we conducted an exploratory factor analysis (EFA) with Maximum Likelihood estimation and oblimin rotation with the com.pass passion score, the dual model passion criteria, HP and OP. As expected, one factor with an explained variance of 67.15% resulted according to the Kaiser criterion and the screeplot [test of model fit:  $\text{Chi}^2(\text{df}) = 13.232(2)$ ,  $p = .001$ ]. The individual factor scores were saved as variable in the data set and used as general



passion measure for the following analysis. The hierarchical regression analysis revealed that passion had incremental validity over sport commitment in the explanation of weekly soccer practice, but that both predictors only explained a very small amount of variance in the criterion ( $R^2 \leq .093$ ). Compared with commitment, the passion measure significantly improves the explanation of the criterion, and when passion is considered, there is no significant contribution of sport commitment to the explanation of the applied indicator of deliberate practice.

Table 13

*Hierarchical linear regression analyses on the incremental validity of passion over sport commitment in the explanation of weekly soccer practice in study 3 (N = 278 German adolescent soccer players)*

Step	Predictor	$\beta$	t	R	$R^2$	Adj- $R^2$	$\Delta R^2$	F Change
1	Sport Commitment	.248	4.060*	.248	.061*	.058	.061	16.481*
2	Sport Commitment	.082	0.997					
2	Passion factor	.244	2.969*	.305	.093*	.086	.032	8.814*

Note. \* =  $p < .05$ .

An analogue analysis was conducted for the criterion ‘wanting to become a professional soccer player’. Since the criterion was assessed as a categorical variable (response options were 1 = *no, not at all*, 2 = *maybe*, 3 = *yes, absolutely*), the analysis was computed as logistic regression within the statistical program Mplus, version 6 (Muthén & Muthén, 2008-2011). As with the previous criterion, the results show that the passion factor has incremental validity over sport commitment in the explanation of this indicator of sport engagement (see Table 14).

Table 14

*Hierarchical logistic regression analyses on the incremental validity of passion over sport commitment in the explanation of vocational soccer aspirations in study 3 (N = 278 German adolescent soccer players)*

Step	Predictor	$\beta$	t	Odds ratio	R	R <sup>2</sup>	$\Delta R^2$	AIC	BIC (adj.)
1	Sport Commitment	.205	2.356*	1.870	.205	.042	.042	674.4	673.5
2	Sport Commitment	-.107	-.897	0.706	.391*	.153*	.111	257.7	256.9
2	Passion factor	.457	3.827*	2.567					

Note. \* =  $p < .05$ .

### *The Factorial Validity of Different Passion and Commitment Measures in the Studies*

#### *One to Three*

The factorial validity of the com.pass scale and all of its subscales, and of the dual model passion scale (Vallerand et al. 2003) were tested in the studies one to three. The factorial validity of the sport commitment scale was tested in the studies two and three. Confirmatory factor analyses (CFA) were conducted with the statistical program Mplus, version 6.1 (Muthén & Muthén, 2008-2011). For the com.pass scale, we expected a four component structure of passion, with one higher-order factor commitment (see Figure 1). For the dual model passion scale from Vallerand et al. (2003), we expected a two-factor solution (see e.g. Marsh et al., 2013; Vallerand et al., 2006, Study 1) and for the sport commitment scale (Scanlan et al., 1993; 2003; Sousa et al., 2008) we expected all items to load on one factor. Table 16 and Table 17 summarize the model fit indices for all measures and studies.

#### *The factorial validity of the com.pass scale*

The models for the com.pass scale were computed as follows: First, a one-factor model with items as manifest variables was estimated separately for each of the four subscales in order to estimate the item-subscale factor loading and the fit indices for the respective subscale, which are documented in Table 16). Then, in order to estimate the complete

com.pass model, item parcel were created with the Single Factor Method (see Aluja & Blanch, 2004; and Little, Cunningham, Shahar, & Widman, 2002). In this method, within each subscale the item with the highest item-to-construct loading was assigned to the item with the lowest loading, then the second highest loading item was assessed to the second smallest loading item and so on. In subscales with odd item numbers, one parcel contained three items (for this procedure see: Aluja & Blanch, 2004). The com.pass subscales intent, identification and long-term goals were each indicated by three parcels, and the subscale desire by two parcels. The estimation of the complete com.pass model (see Figure 1) included five latent variables: four for each subscale and the higher-order factor ‘commitment’, which loaded on the lower-order factors ‘intent’, ‘identification’, and ‘long-term goals’. The model estimation included the correlation between the latent variables ‘commitment’ and ‘desire’.

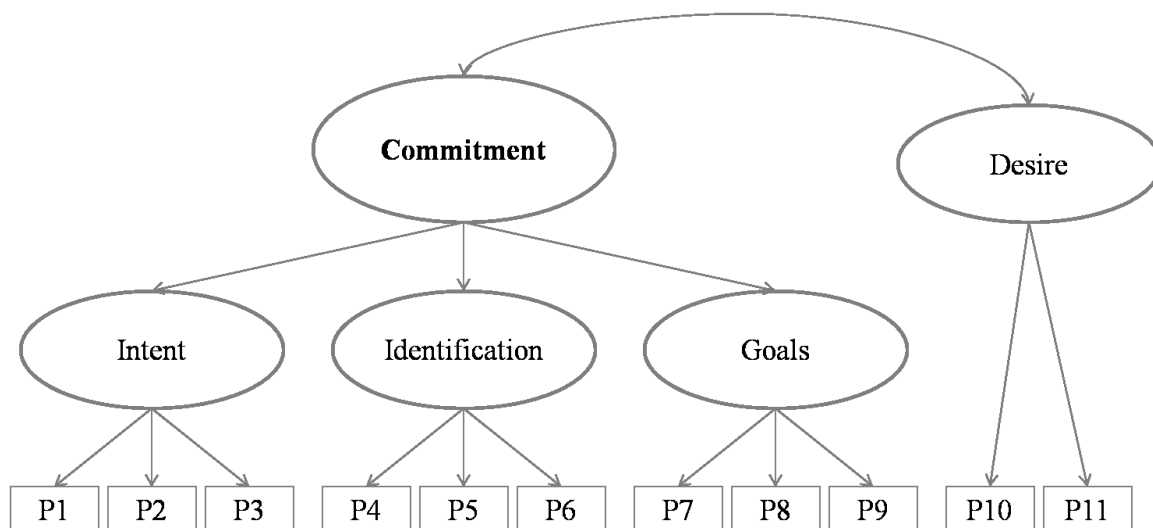


Figure 1: CFA com.pass model

The factorial validity of the com.pass subscales and of the complete com.pass model (see Figure 1) were not satisfying. Only one subscale (long-term goals) was satisfyingly factorial valid, and this only in study three. Correlated residuals within and across the different subscales impaired the model fit. Particularly the subscale ‘desire’ had problematic model fit indices.

In order to improve the factorial validity of the com.pass scale, particularly that of its subscale ‘desire’, we tested additional items in study three. The CFAs for this new item set are summarized in

Table 17. With the new item set, the com.pass model fitted the data satisfactorily. Particularly the subscale ‘desire’, whose reliability and factory validity were problematic with the first item set, was improved a lot by the additional items.

*The factorial validity of the dual model passion scale*

The two-factor structure of the dual model passion scale from Vallerand et al. (2003) was tested with the same parceling method. First, all three subscales (general passion criteria, harmonious passion and obsessive passion) were individually tested in CFAs with items as manifest indicators. Then parcels were formed and a model with harmonious and obsessive passion as latent and correlated factors was estimated (see Vallerand et al., 2003), with each of these latent variables being indicated by three item parcels. Because of the high latent correlation between HP and OP (see

Table 15), a one-factor model was also estimated and it was tested which of the models fit the data better (see below). The factorial validity of the dual model passion scale.

The factorial validity of the dual model passion scale was tested individually for each of the three subscales with items as manifest variables, and for the dual factor model with parcels as manifest indicators. The factorial validity of the HP and OP subscales on item level was not satisfying. Solely the ‘general passion criteria’ subscale had satisfactorily model fit indices.

The two factor model did not fit well to the data. This is inconsistent with previous findings that also reported suboptimal but still much better model fits (Marsh et al., 2013, table 2; Vallerand et al., 2003; Study 1) and with the previous studies that found good model fits (Bureau, Vallerand, Ntoumanis, & Lafrenière, 2013; Rip et al., 2012). The modification

indices indicated that correlated residuals (correlations between HP and OP parcels) accounted for the bad model fit. The latent correlation between HP and OP was strong in all three studies (see Table 15). This is in line with previous findings (Mageau et al., 2009; Vallerand et al., 2003; 2006), although the effect sizes reported in previous studies have inconsistently ranged from low to high (e.g. Rip et al., 2006; Vallerand et al., 2007; Vallerand, Ntoumanis, et al., 2008).

Table 15

*Correlations between the latent variables HP and OP in the CFAs in studies 1, 2 and 3*

	Study 1	Study 2	Study 3
Latent correlation Harmonious with obsessive passion	.681*	.881*	.765*

Note. \* =  $p < .05$ .

Because of the strong correlations between HP and OP, a one factor model was tested against the two-factor model in all three studies. In all studies, the two factor model fitted the data better than the one-factor model, and the corresponding Chi-square difference values were all significant.

*The factorial validity of the sport commitment scale*

The model for the Sport Commitment subscale ‘commitment’ was estimated as one-factor model with the six corresponding items as manifest indicators. The sixth items of the sport commitment scale fitted the one factor model relatively well in the two studies in which it was applied. Residual correlations impaired the model fit (in study two between the third and fourth, and second and sixth item, in study three between the third and sixth item). When this correlation was included in the model, the fit indices were excellent.

Table 16

*Model fit Indices for the Confirmatory Factor Analysis for the applied measures in studies 1, 2 and 3*

		$\chi^2$ (df)	p	CFI	TLI	RMSEA (90& CI)	SRMR
Intent (com.pass): 1 Factor	S1	94.645 (9)	.000	.878	.797	.144 (.118-.171)	.059
	S2	47.049 (9)	.000	.841	.736	.128 (.093-.165)	.060
	S3	29.762 (9)	.000	.954	.924	.093 (.057-.131)	.043
Identification (subscale com.pass): 1 Factor	S1	202.066 (9)	.000	.857	.762	.219 (.193-.245)	.057
	S2	99.671 (9)	.000	.821	.701	.196 (.161-.232)	.073
	S3	54.974 (9)	.000	.921	.869	.140 (.106-.177)	.045
Long-term goals (subscale com.pass): 1 Factor	S1	89.832 (5)	.000	.931	.861	.194 (.160-.230)	.040
	S2	148.652 (5)	.000	.707	.414	.329 (.285-.376)	.105
	S3	5.346 (5)	.375	.999	.999	.016 (.000-.088)	.012
Desire (subscale com.pass): 1 Factor	S1	100.262 (2)	.000	.794	.381	.326 (.273-.382)	.102
	S2	51.168 (2)	.000	.683	.048	.303 (.235-.378)	.099
	S3	9.828 (2)	.007	.955	.864	.122 (.054-.202)	.034
Commitment (subscale com.pass): 3 Factors <sup>P</sup>	S1	120.056(17)	.000	.945	.910	.119 (.100 - .140)	.062
	S2	61.539(17)	.000	.950	.917	.103 (.076 - .132)	.046
	S3	51.708 <sup>W11</sup>	.000	.975	.958	.090 (.063 - .119)	.031
Passion (subscale com.pass): 4 lower order factors, 1 higher order factor (commitment) <sup>P</sup>	S1	193.882 (31)	.000	.928	.859	.112 (.097-.127)	.066
	S2	98.176 (31)	.000	.930	.899	.095 (.074-.116)	.055
	S3	93.337 (31)	.000	.962	.945	.090 (.069-.111)	.034
Harmonious Passion: 1 Factor	S1	95.543(14)	.000	.879	.818	.129 (.105-.154)	.060
	S2	81.400(14)	.000	.832	.748	.137(.109-.166)	.067
	S3	47.892(14)	.000	.965	.947	.097(.068-.128)	.035
Obsessive Passion: 1 Factor	S1	95.447(14)	.000	.911	.867	.131(.107-.156)	.045
	S2	83.715(14)	.000	.908	.862	.138(.110-.167)	.049
	S3	78.207(14)	.000	.954	.931	.135(.107-.165)	.032
Passion criteria (Dual Model Passion Scale): 1 Factor	S1	12.643 (2) <sup>W12</sup>	.002	.965	.894	.123 (.065-.192)	.044
	S2	10.068 (2)	.007	.945	.835	.123 (.055-.202)	.038
	S3	5.178 (2)	.075	.994	.983	.079 (.000-.166)	.016
HP & OP (Dual Model Passion Scale): 2 Factors <sup>P</sup>	S1	93.083 (8)	.000	.903	.819	.177 (.146-.211)	.080
	S2	64.205 (8)	.000	.922	.855	.167 (.131-.206)	.064
	S3	94.755(8)	.000	.936	.881	.210 (.173-.248)	.051
Sport Commitment Scale: 1 Factor	S2	40.207 (9)	.000	.909	.849	.114 (.080-.151)	.050
	S3	39.657 (9)	.000	.950	.917	.119 (.082-.158)	.035

Note. S1 = Study 1 (N1 = 471 German undergraduate students); S2 = Study 2 (N2 = 248 Brazilian private school students); S3 = Study 3 (N3 = 278 German leisure soccer player); <sup>P</sup> = the manifest indicators in this model were parcel; <sup>W11</sup> = Warning: The model could not be estimated properly because the latent variable covariance matrix was not positive definite. <sup>W12</sup> = Warning, The model could not be estimated properly because there was a negative residual covariance ('Heywood case').

Table 17

*Model fit Indices for the parcel-based Confirmatory Factor Analysis for the new com.pass scale item set in study 3*

	$\chi^2$ (df)	<i>p</i>	<i>CFI</i>	<i>TLI</i>	<i>RMSEA</i> (90% <i>CI</i> )	<i>SRMR</i>
Intent <sup>P</sup>	16.931(5)	.005	.983	.965	.096 (.048 – .148)	.023
Identification <sup>PI</sup>	13.188(2)	.001	.978	.933	.148 (.079 – .228)	.023
Long-term goals	13.539(9)	.140	.994	.991	.044 (.000 – .088)	.018
Desire <sup>P</sup>	0.520(2)	.771	1.000	1.010	.000 (.000 – .082)	.005
Commitment subscale <sup>P</sup>	149.444(41)	.000	.946	.928	.104 (.086 – .122)	.038
Com.pass model <sup>P</sup>	222.011(86)	.000	.951	.940	.086 (.069 – .095)	.037

Note. <sup>P</sup> = the manifest indicators in this model were parcel, <sup>PI</sup> = three manifest indicators in this model were parcels, but the fourth was a single item, because the original item number had been odd and the model fit estimation required four indicators, so the item with the highest item-to factor loading was added as manifest indicator and the other six items were parceled according to the Single Factor Method.

#### Testing central Assumptions of the Com.pass Model

The com.pass scale was developed as an operationalization of the com.pass model and all of its components (Moeller & Grassinger, 2013). Therefore, testing the construct validity of the com.pass scale requires tests of some central assumptions of the com.pass model. The last analyses therefore tested the two assumptions 1) that commitment is a central component of passion, and 2) that the general degree of passion accounts for differences between homogeneous groups of highly passionate and lowly passionate individuals.

##### *Is commitment a component of passion?*

A crucial assumption of the com.pass model states that passion and commitment are no distinct constructs but that commitment is a component of passion. Strong correlations between the manifest commitment and passion scale scores support this assumption (see Table 9 and Table 10). However, more certainty was required in order to determine if passion and commitment both constructs should be regarded as strongly correlated, or as the same construct. To test these two possibilities against each other, model comparisons were

computed in the statistical program Mplus, version 6.1. First, measurement models for the assessment of commitment and passion were specified (see below). Then the relation between passion and commitment was investigated by comparison of different structural models. The analyses were conducted in the two studies in which sport commitment, the com.pass scale and the dual model passion scale had been assessed (study two: Brazilian adolescents and study three: German adolescent soccer player).

#### The Measurement model regarding commitment

Commitment was measured with the six items of the sport commitment scale and the three commitment subscales of the com.pass scale (intent, identification, and long-term goals). Because of the relatively low sample size it seemed advisable to reduce the number of estimated parameters. Therefore, the four commitment subscales were not estimated as latent variables, but entered as manifest indicators (computed as the mean of the corresponding items). The measurement model fitted the data well (see Table 18).

#### The Measurement model regarding passion

Passion was measured with all subscales of the dual model passion scale (harmonious passion, obsessive passion, and the general passion criteria) and with the passion-specific fourth subscale of the com.pass scale, desire. These subscales were entered as manifest instead of latent variables for the above mentioned reasons. The measurement model fitted the data well in study two and still acceptable in study three (see Table 18).



Table 18

*Model fit Indices for the measurement models*

	$\chi^2 (df)$		<i>p</i>		<i>CFI</i>		<i>TLI</i>		<i>RMSEA (90% CI)</i>		<i>SRMR</i>	
	<i>S2</i>	<i>S3</i>	<i>S2</i>	<i>S3</i>	<i>S2</i>	<i>S3</i>	<i>S2</i>	<i>S3</i>	<i>S2</i>	<i>S3</i>	<i>S2</i>	<i>S3</i>
Measurement Model	0.280(2)	3.299(2)	.869	.192	1.000	.998	1.018	.994	.000 (.000 - .065)	.054 (.000 - .153)	.005	.010
Commitment Measurement Model	2.691 (2)	6.890(2)	.260	.032	.998	.991	.994	.974	.037 (.000 - .138)	.120 (.026 - .191)	.013	.016

Note. S1 = Study 1 (N1 = 471 German undergraduate students); S2 = Study 2 (N2 = 248 Brazilian private school students); S3 = Study 3 (N3 = 278 German leisure soccer player).

### The Structural Model Regarding the Relation between Passion and Commitment: Model comparison.

For the model comparison, two competing models were estimated (see Figure 2). The main difference between both models concerned the correlation between the latent variables commitment and passion, which was freely estimated in model one but restricted to  $r = 1$  in model 2. The model fit indicators were better for the unrestricted model 1 (see Table 19), according to which commitment and passion are correlated but distinct entities. The Chi-square difference test was significant, which means that model one fitted the data significantly better than model two. However, the estimated correlation between the latent variables commitment and passion in model one was very strong in both studies ( $r_{S2} = .914$ ;  $r_{S3} = .956$ ). According to the Fornell-Larcker criterion (Fornell & Larcker, 1981), discriminant validity of a construct can be assumed if the squared correlation of this construct with any other construct is smaller than the ‘average variance extracted’ (AVE)<sup>9</sup>. In the case of commitment and commitment (model 1), this requirement is not met, the difference of the AVE minus the correlation between commitment and passion is negative in both studies ( $\Delta_{\text{commitment}S2} = -.09$ ;  $\Delta_{\text{commitment}S3} = -.05$ ;  $\Delta_{\text{passion}S2} = -.03$ ;  $\Delta_{\text{passion}S3} = -.05$ ). These findings together with the principle of parsimony support the assumption that passion and commitment are rather aspects of the same phenomenon than distinct constructs.

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<sup>9</sup> The AVE is an important measure for the reliability of a construct (Fornell & Larcker, 1981). It measures the average proportion of variance of all indicators of a particular construct that is explained by the latent variable representing that construct. The variance of each indicators of the construct is decomposed into 1) the variance that is explained by the latent variable that represents the construct, and 2) variance that is not explained (the measurement error). In a second step, the average score for both the explained and unexplained variance across all indicators is computed. The AVE is then computed as quotient of these averaged variance components.

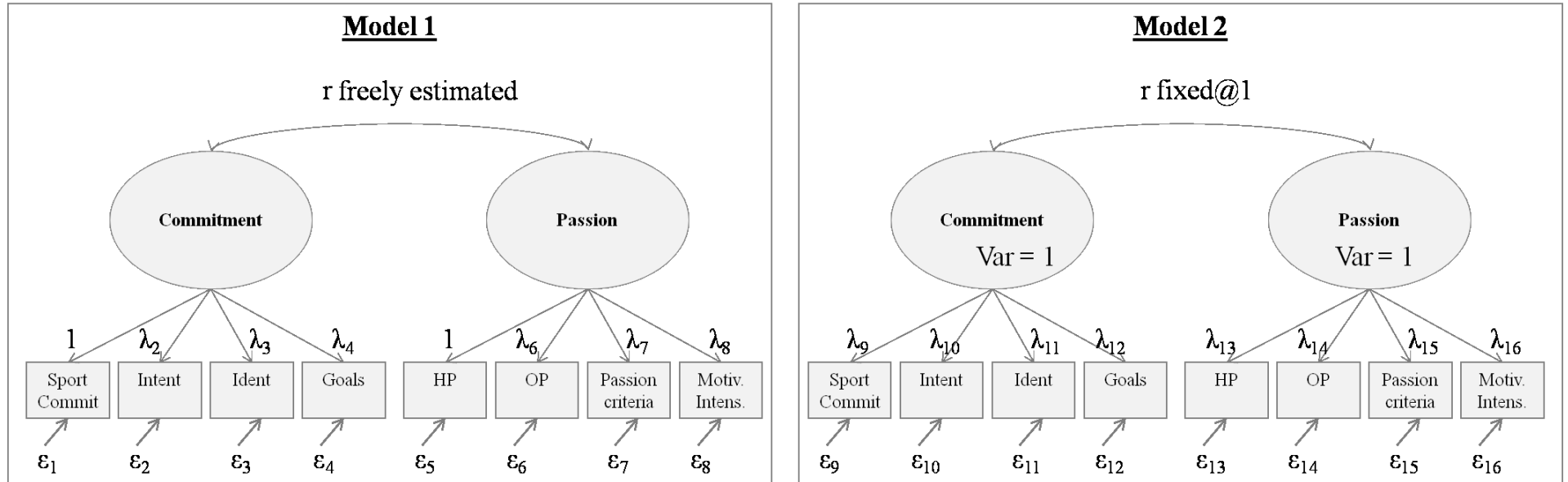


Figure 2: Model comparison for the question whether commitment is a component of passion or rather a distinct construct

Table 19

Model fit Indices for the model comparison

	$\chi^2(df)$		<i>p</i>		<i>CFI</i>		<i>TLI</i>		<i>RMSEA (90% CI)</i>		<i>SRMR</i>		<i>p value for <math>\chi^2</math> difference</i>	
	<i>S2</i>	<i>S3</i>	<i>S2</i>	<i>S3</i>	<i>S2</i>	<i>S3</i>	<i>S2</i>	<i>S3</i>	<i>S2</i>	<i>S3</i>	<i>S2</i>	<i>S3</i>	<i>S2</i>	<i>S3</i>
Model 1	62.357(19)	104.199(19)	.000	.000	0.949	0.94	0.926	0.911	.101 (.074-.129)	.148 (.121 - .176)	.038	.040	.001	.001
Model 2	74.014(20)	115.408(20)	.000	.00	0.937	0.933	0.912	0.906	.110 (.084-.137)	.152 (.126 - .180)	.040	.038		

Note. S1 = Study 1 (N1 = 471 German undergraduate students); S2 = Study 2 (N2 = 248 Brazilian private school students); S3 = Study 3 (N3 = 278 German leisure soccer player).

*Testing the assumption that the com.pass scale and the dual model passion scale measure the same construct*

Another crucial assumption of the com.pass model states that the coincidence of commitment and desire is general passion, and corresponding scales should measure the same construct as other passion scales. The com.pass scale and the three subscales of the dual model passion scale have in common that they are all supposed to measure the same construct: passion. This was tested in confirmatory factor analyses (CFAs). As in the previous analyses, the scale and subscale values were entered as manifest variable in order to decrease the number of estimated parameters. The analyses were conducted for all three main studies of this article (study one to three). The estimated model is visualized in Figure 3.

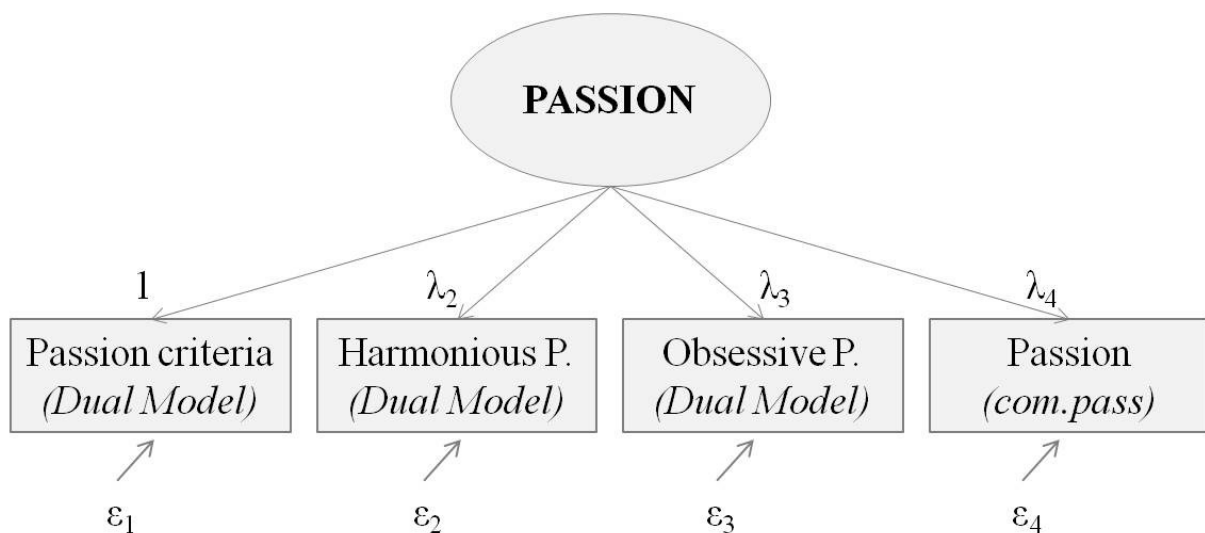


Figure 3: Model test: Are the com.pass scale and the dual model passion subscales indicators of the same latent variable?

The results are summarized in Table 20. In two of three studies (Studies two and three), the model fitted very well to the data. In the first study (among German undergraduate students), the Chi-square value, TLI and RMSEA indicated a suboptimal model fit, which was caused by correlated residuals (between HP and the dual model passion criteria as well as between OP and the com.pass passion score).

Table 20

*Model fit Indices for the assumption that the com.pass scale and the dual model passion scale measure the same construct*

$\chi^2 (df)$			<i>p</i>			<i>CFI</i>			<i>TLI</i>			<i>RMSEA (90% CI)</i>			<i>SRMR</i>		
<i>S1</i>	<i>S2</i>	<i>S3</i>	<i>S1</i>	<i>S2</i>	<i>S3</i>	<i>S1</i>	<i>S2</i>	<i>S3</i>	<i>S1</i>	<i>S2</i>	<i>S3</i>	<i>S1</i>	<i>S2</i>	<i>S3</i>	<i>S1</i>	<i>S2</i>	<i>S3</i>
18.534(2)	2.365(2)	4.558(2)	.000	.307	.102	.961	.999	.996	.884	.997	.987	.153	.028	.077	.030	.010	.011
												(.095 - .220)	(.000 - .137)	(.000 - .173)			

Note. S1 = Study 1 (N1 = 471 German undergraduate students); S2 = Study 2 (N2 = 248 Brazilian private school students); S3 = Study 3 (N3 = 278 German leisure soccer player).

*Cluster analyses of all passion measures: The degree versus the type of passion*

In each of the studies one to three, we conducted additional analyses with the purposes to identify components of passion that account for differences between homogeneous groups of individuals. In order to find out which components of passion distinguish between homogenous groups of individuals, two-step cluster analyses were computed in the program SPSS, version 19. Manifest variables for this analysis were the two main com.pass subscales 'commitment' and 'desire', and the three dual model passion scale subscales harmonious passion, obsessive passion, and general passion criteria.

The analyses were computed within each of the studies 1-3. The results were the same in each of these three studies: Two clusters were found, one of highly passionate individuals and the second of lowly passionate individuals. Individuals in the high passion cluster had high values in all measures of passion, including the both passion types HP and OP. Correspondingly, individuals of the low passion cluster displayed low scores in both HP and OP, and all passion components. As expected, the two clusters also differed in their average score for sport commitment in the two studies in which this scale had been assessed (study 2 and study 3). The average sport commitment score was high in the high passion cluster and low in the low passion cluster. The effect sizes for differences between these clusters were high in all studies in with regard to all passion and commitment measures ( $d \geq 1.15$ ). These results were found in three independent studies across different activity contexts and two different countries (Germany and Brazil). The results are summarized in Table 21. Figure 4 visualizes the cluster differences in the variables that were used in the cluster analyses and in the average sport commitment score. In order to get all scales to a comparable metric without losing information about mean differences between the scales, all scales were transformed with the monotonous 'proportion of maximum scoring method' (POMS; Little, 2013). This transformation results in a scale ranging from 0 to 1 for each variable and does not conceal

mean-level differences between the scales as the standardization would do. Figure 4 shows the high similarities of the clusters with the same label in the different studies. The average scores of the passion and commitment scales for the low passion cluster are very similar in all three studies as visualized by the overlaps of the triangles in Figure 4. Likewise, most passion and commitment mean values in the high passion cluster overlap much between the three studies. Interestingly there are mean-level differences between the passion scales. The average score of obsessive passion is generally lower than the mean score of the other passion measures, this can be observed in both clusters. In other words, the items of the obsessive passion scale are more difficult than for instances those of the harmonious passion scale (see also Table 26). In sum, the findings of the cluster analyses support the assumption of the com.pass model that individuals differ in their general degree of passion. They do not the assumption of the dual model of passion, according to which one would expect to find a cluster of genuinely harmoniously passionate individuals and a cluster of obsessively passionate individuals.

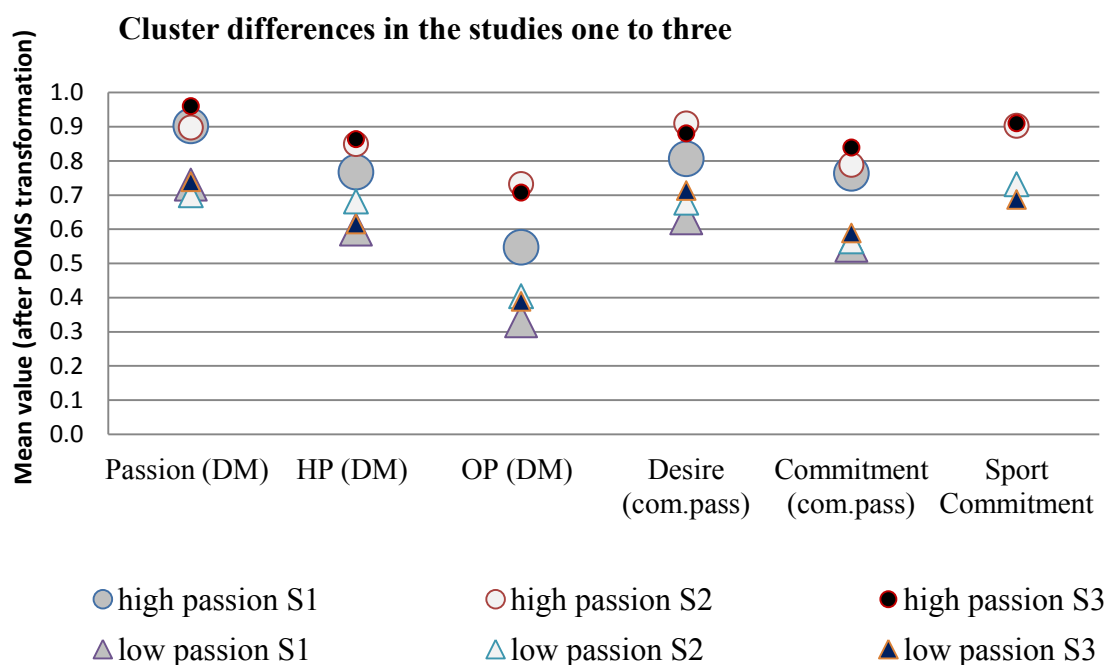


Figure 4: Cluster differences in the studies one to three.

Table 21

*Differences between clusters*

	Cluster 1 (“high passion”)						Cluster 2 (“low passion”)						t-Test for cluster differences						
	S 1		S 2		S3		S 1		S 2		S3		S 1		S 2		S3		
	N		N		N		N		N		N		<i>p</i>	<i>d</i>	<i>p</i>	<i>d</i>	<i>p</i>	<i>d</i>	
	N = 194		N = 126		N = 137		N = 158		N = 147		N = 124								
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>p</i>	<i>d</i>	<i>p</i>	<i>d</i>	<i>p</i>	<i>d</i>	
1. Passion <sub>com.pass</sub>	4.92	.429	5.24	0.38	5.30	.406	3.96	.584	4.11	0.555	4.25	.562	.000	1.91	.000	2.36	.000	2.14	
2. Passion <sub>DM</sub>	6.41	.397	6.38	0.499	6.76	.321	5.38	.616	5.2	0.809	5.43	.765	.000	2.03	.000	1.74	.000	2.30	
3. HP (DM)	5.60	.595	6.09	0.645	6.18	.552	4.59	.782	5.09	1.035	4.69	.720	.000	1.47	.000	1.15	.000	2.34	
4. OP (DM)	4.28	1.110	5.39	1.117	5.24	1.259	2.98	1.065	3.42	1.15	3.33	1.173	.000	1.19	.000	1.73	.000	1.57	
5. Sport Commitment	n.a.	n.a.	4.61	0.387	4.64	.374	n.a.	n.a.	3.93	0.56	3.75	.681	n.a.	n.a.	.000	1.40	.000	1.65	

Note. S 1 = Study 1 (N1 = 471 German undergraduate students); S 2 = Study 2 (N2 = 248 Brazilian private school students); S 3 = Study 3 (N3 = 278 German leisure soccer

player); DM = Dual Model Passion Scale; HP = harmonious passion; OP = obsessive passion; DM = Dual Model of Passion. Indicators were: the compass subscales commitment

and desire, the DM passion criteria subscale, and the DM subscales for harmonious and obsessive passion; n.a. = not assessed.



### General Discussion

This article summarizes several studies on research questions regarding the commitment and passion (com.pass) model and the newly developed com.pass scale. First, the psychometric properties of the com.pass scale were investigated. It was shown that the com.pass scale is a reliable and valid instrument for the measurement of passion for activities. One of its strengths is its distinction between specific components of passion, particularly between the components commitment and desire. The capacity of the com.pass scale to simultaneously measure ‘classic’ commitment and motivationally intense passion helps integrating these previously separated research lines, which is a desirable remedy to current terminological ambiguities (see Moeller & Grassinger, 2013). As stated in the com.pass model, it was shown that commitment is an important component of passion, but that passion has incremental validity over commitment in the explanation of aspects of deliberate practice. The latter finding requires replication, preferably with more objective measures of deliberate practice. The com.pass scale differs from other instruments in its capacity to systematically integrate aspects of short-term affective responsiveness and aspects of long-term commitment, to distinguish between specific components of passion and commitment, and in its incremental validity over other measures of passion and commitment in the explanation of long-term sport practice. For studies in which one of these aspects is of interest, the com.pass scale is therefore the recommended instrument.

Some aspects of the com.pass scale should be improved by future research. For instances, the English item set still has to be tested; the findings concerning the new item set (see our third main study) should be replicated, and it is desirable to identify items that could be discarded in order to achieve a more economic instrument. At the moment, economy can be achieved by selecting item subsets in correspondence with the specific research question and by using the short version of the com.pass scale (see Table 27). For studies in which it is

relevant to distinguish between specific components of passion, we recommend the use of the whole com.pass scale with the new item set (see study three). Particularly the com.pass subscale 'desire' should be assessed with the new item set, because this subscale has won much reliability and factorial validity since the new items were added. For studies in which the degree of passion is relevant but the distinction between single components is not, we recommend to use the short version of the com.pass scale (see Table 27) which is based on the items with the best psychometric properties and / or a short version of the dual model passion scale.

Unlike the previously established dual model passion scale (Vallerand et al., 2003), the com.pass scale does not distinguish between harmonious and obsessive types of passion, but emphasizes the degree of general passion instead. This focus was supported in our cluster analyses, which revealed that the general degree of passion (high versus low), rather than the type of passion (HP versus OP) distinguished between clusters of individuals (for similar findings see Wang & Yang, 2008, and Moeller, Keiner et al., 2013). We recommend that future studies shed more light on the differences between highly and lowly passionate individuals. The com.pass scale can be very useful for such studies, given that it is a more reliable and detailed measure of the general passion degree than the formerly used four-item passion criteria subscale of the dual model passion scale. However, if required by the research question, the component-specific assessment of the general passion degree with the com.pass and the assessment of types of passion with the dual model passion scale can easily be integrated by combining the HP and OP subscales with the com.pass scale. It should be noted, though, that the dual model of passion was not confirmed in our analyses, because of the strong correlations between harmonious and obsessive passion, each of which were reliably measured. The fact that similarly strong correlations between the two types of passion have been reported in several previous studies (e.g. Séquin-Lévesque et al., 2003; Vallerand et al., 2006, study 3; Vallerand, Ntoumanis, et al., 2008, study 1) points out that the distinction

between harmonious and obsessive passion, or harmoniously passionate and obsessively passionate individuals, might not be as clear as it has been assumed. Many studies also report moderate or small correlations between the two types of passion, and this variety of findings requires explanation. Future studies should identify determinants of the effect size of the correlation between harmonious and obsessive passion. It cannot be ruled out that the correlations in these –and previous– studies on passion are inflated because of response biases. Therefore, more objective measures like reports by significant others and objective behavioral data should complement the assessment of passion in future studies.

## Appendix

Wording of relevant items, item-subscale assignment, and psychometric properties

Table 22

*Item formulation for the German, Portuguese and English version of the com.pass scale*

Item no.	German item set	Item formulation Brazilian Portuguese item set	English item set (not tested yet)
1	Ich versuche zu verhindern, dass etwas dazwischen kommt, das mich von dieser Aktivität abhalten könnte.	Eu tento evitar que ocorra qualquer coisa que possa me impedir de realizar essa atividade.	I try to avoid everything that could prevent me from doing this activity.
2	Wenn ich die Wahl zwischen verschiedenen attraktiven Aktivitäten habe, ist mir diese Aktivität immer lieber.	Se eu tenho a escolha entre duas atividades que me atraem, essa atividade sempre me agrada mais.	If I have the choice between two attractive activities, I always prefer this activity.
3	Ich achte jeden Tag darauf, dass ich genug Gelegenheit habe, mich dieser Aktivität zu widmen.	Todos os dias eu me preocupo em ter a chance de realizar essa atividade.	Every day I attend to have enough opportunities to dedicate myself to this activity.
4	Ich freue mich meist ungeduldig auf diese Aktivität.	Normalmente eu estou ansioso por realizar essa atividade.	Usually I am impatiently looking forward to do this activity.
5	Ich versuche im Alltag so zu planen, dass so viel Zeit wie möglich für diese Aktivität übrig bleibt.	Eu tento organizar meu cotidiano de forma que eu tenha o maior tempo possível para essa atividade.	I try to organize my everyday life in a way that allows me to spend as much time as possible with this activity.
6	Ich möchte diese Aktivität unbedingt regelmäßig ausüben.	Eu quero de toda forma realizar essa atividade regularmente.	I absolutely want to practice this activity regularly.
7	Ich definiere mich über diese Aktivität (z.B. Ich sage nicht einfach nur "Ich spiele gerne Rollenspiele / Fußball", sondern ich sage: "Ich bin Rollenspieler/in / Fußballer/in").	Eu me defino por meio desta atividade (por exemplo, eu não só digo "eu danço / eu jogo futebol/ eu toco guitarra" mas digo "eu sou dançarino(a)/ jogador(a) de futebol/ guitarrista"	I define myself through this activity. (e.g. I don't say „I dance / play soccer / collect stamps“ but “I am a dancer / soccer player /stamp collector”).
8	Ich erzähle gerne Anderen, dass ich jemand bin, der diese Aktivität ausübt.	Eu gosto de falar para outras pessoas que sou alguém que faz esta atividade.	I like to tell others that I am someone who practices this activity.
9	Wenn von dieser Aktivität die Rede ist, denken meine Freunde immer sofort an mich.	Quando se fala desta atividade, meus amigos sempre pensam em mim.	When people speak about this activity, my friends always think of me.

Table 22 (continued)

*Item formulation for the German, Portuguese and English version of the com.pass scale*

Item no.	German item set	Item formulation Brazilian Portuguese item set	English item set (not tested yet)
10	Andere definieren mich über diese Aktivität und sagen z.B.: „Max/Lena ist Rollenspieler/in / Fußballspieler/in“.	Outros me definem por meio desta atividade e dizem sobre mim, por exemplo, “Fulano(a) é dançarina/ jogador de futebol/guitarrista...”.	Others define me through this activity and say e.g. „He / she is a dancer / soccer player / stamp collector“.
11	Diese Aktivität gehört fest zu mir. Ohne diese Aktivität wäre ich nicht ich.	Essa atividade pertence a quem eu sou. Sem esta atividade eu não me sentiria como eu mesmo.	This activity belongs to me. Without this activity, I would not be the same.
12	Ich identifiziere mich stark mit dieser Aktivität.	Eu me identifico fortemente com esta atividade.	I strongly identify with this activity.
13	Auch in Zukunft wird mir keine andere Aktivität jemals so viel bedeuten wie diese Aktivität.	Até no futuro nenhuma outra atividade me importará tanto como esta.	No else activity will ever mean so much to me as this one.
14	Diese Aktivität soll in meiner Zukunft eine herausragende Rolle spielen.	Esta atividade deverá ter um papel extraordinário no meu futuro.	This activity shall play an outstanding role in my future.
15	Ich möchte auch in der Zukunft diese Aktivität intensiv ausüben.	Eu quero continuar a praticar esta atividade intensivamente no futuro.	Also in the future I want do practice this activity intensively.
16	Ich werde alles tun, was ich kann, um diese Aktivität in Zukunft ausüben zu können.	Eu vou fazer todo o possível para poder continuar a praticar esta atividade no futuro.	I will do everything that I can in order to practice this activity in the future.
17	Ich habe viele persönliche Ziele, die etwas mit dieser Aktivität zu tun haben.	Eu tenho muitos objetivos pessoais que são relacionados com esta atividade.	I have many personal goals concerning this activity.
18	Ich bin während dieser Aktivität hochkonzentriert.	Normalmente eu fico muito focado quando pratico essa atividade.	I am highly concentrated while doing this activity.
19	Ich bin grundsätzlich sehr wach während dieser Aktivität.	Eu fico alerta (“ligado”) quando realizo essa atividade.	I am generally very alert while performing this activity.
20	Während dieser Aktivität erlebe ich intensive Gefühle (z.B. starke Freude und/oder starker Stolz und/oder starke Wut und/oder starke Trauer).	Durante essa atividade eu tenho (uma ou várias) emoções fortes (ex.: alegria, tristeza, orgulho, raiva).	I experience intense feelings while doing this activity. (e.g. such as strong joy and /or strong pride and / or strong anger, and / or strong sadness).

Table 22 (continued)

*Item formulation for the German, Portuguese and English version of the com.pass scale*

Item no.	German item set	Item formulation Brazilian Portuguese item set	English item set (not tested yet)
21	Diese Aktivität ist für mich ein intensives Erlebnis.	Essa atividade é uma experiência intensa para mim.	This activity is an intense experience for me.
22 <sub>new</sub>	Ich habe die feste Absicht, regelmäßig Fußball zu spielen*.	Tenho a intenção de praticar esta atividade regularmente.	I definitely intent to do this activity regularly.
23 <sub>new</sub>	Ich bin stolz darauf, Fußballspieler* zu sein.	Eu estou orgulhoso/a de ser praticante desta atividade.	I am proud to be a practitioner of this activity.
24 <sub>new</sub>	Oft nehme ich mir vor, beim nächsten Mal Fußballspielen* etwas Bestimmtes zu tun oder auszuprobieren.	Muitas vezes eu pretendo fazer, ou tentar fazer, determinada coisa para quando novamente fizer esta atividade.	I often plan in advance to do something or to try out something particular the next time I do this activity.
25 <sub>new</sub>	Wenn ich Fußball* spiele, bin ich voll Energie.	Quando faço essa atividade, eu me sinto cheio de energia.	When I do this activity, I feel full of energy.
26 <sub>new</sub>	Ich plane häufig, was ich noch tun muss, um das nächste Mal Fußball* spielen zu können.	Muitas vezes eu planejo o que preciso fazer para poder voltar a fazer esta atividade.	I often plan what I have to do in order to be able to do this activity the next time.
27 <sub>new</sub>	Selbst wenn ich mich müde oder matt fühle werde ich hellwach, wenn sich plötzlich die Gelegenheit zum Fußballspielen* ergibt.	Mesmo quando eu me sinto cansado/a ou desanimado, eu me animo imediatamente quando ocorre a oportunidade de fazer esta atividade.	Even when I feel tired or droopy, I immediately become alert when I get the opportunity to do this activity.
28 <sub>new</sub>	Ich schmiede häufig Pläne rund um das Fußballspielen.	Muitas vezes eu faço planos referentes a esta atividade.	I often make plans around this activity.
29 <sub>new</sub>	Ich verspüre häufig ein drängendes Bedürfnis, Fußball* zu spielen.	Frequentemente eu sinto um ímpeto forte de fazer esta atividade.	I often feel a strong desire to do this activity.
30 <sub>new</sub>	Beim Fußballspielen*, möchte ich in Zukunft noch einiges erreichen.	Em relação a essa atividade eu pretendo alcançar varias metas no futuro.	I want to achieve something with this activity in the future.
31 <sub>new</sub>	Ich fühle oft einen starken Drang, Fußball* zu spielen.	Muitas vezes eu sinto uma necessidade urgente de fazer esta atividade.	I often feel a strong urge to do this activity.

Note. The English item set was only translated and not tested yet. <sup>new</sup> = Item belonged to the new item set that was only tested study 3. \* = the new items were only tested in the soccer sample. Therefore, the original item wording refers to soccer instead as to general activities. The corresponding Portuguese and English items were not tested yet. For the item-subscale assignment, see Table 23 and Table 24.

Table 23

*Item formulation and properties for the com.pass scale in the studies 1, 2 and 3*

Item no.	Sub-scale	<i>r</i>				<i>p</i>			$\alpha$				<i>S</i>			<i>C</i>			$\beta$			
		S1	S2	S3	S3 <sub>new</sub>	S1	S2	S3	S1	S2	S3	S3 <sub>new</sub>	S1	S2	S3	S1	S2	S3	S1	S2	S3	S3 <sub>new</sub>
1	1	.60	.52	.48	.44	72.6	65.0	74.1	.72	.62	.78	.88	-0.90	-0.49	-1.17	0.34	-0.80	0.93	.69	.66	.49	.46
2	1	.52	.38	.48	.48	74.4	72.0	81.5	.74	.67	.80	.88	-0.75	-0.78	-0.96	0.39	-0.11	0.83	.59	.45	.39	.39
3	1	.46	.38	.62	.69	62.9	61.2	66.0	.76	.67	.74	.86	-0.43	-0.32	-0.22	-0.29	-1.16	-0.73	.56	.48	.77	.76
4	1	.43	.42	.59	.64	68.4	76.3	71.3	.77	.66	.75	.86	-0.47	-1.15	-0.66	-0.05	0.73	0.14	.51	.52	.64	.67
5	1	.65	.46	.69	.74	63.8	64.6	65.3	.71	.64	.72	.85	-0.36	-0.42	-0.30	-0.60	-0.85	-0.47	.75	.58	.84	.81
6	1	.50	.43	.52	.62	85.6	84.8	81.0	.75	.66	.77	.86	-1.47	-1.54	-0.93	3.00	2.94	0.83	.56	.51	.59	.66
7	2	.70	.60	.64	.66	48.4	49.1	76.5	.84	.77	.82	.84	0.13	0.07	-0.94	-1.14	-1.45	0.39	.77	.69	.70	.72
8	2	.59	.48	.56	.58	64.3	71.3	74.4	.86	.79	.83	.85	-0.59	-0.94	-1.02	-0.48	-0.06	1.03	.63	.52	.61	.63
9	2	.67	.65	.62	.62	57.5	64.7	60.7	.85	.75	.82	.84	-0.35	-0.66	-0.22	-0.69	-0.63	-0.66	.73	.76	.68	.66
10	2	.74	.64	.66	.66	44.3	48.0	62.6	.84	.76	.81	.84	0.11	-0.06	-0.35	-1.03	-1.36	-0.57	.81	.76	.70	.69
11	2	.61	.52	.62	.63	71.7	70.1	75.1	.86	.78	.82	.84	-1.00	-0.88	-0.96	0.54	-0.42	0.46	.68	.57	.71	.72
12	2	.73	.50	.69	.70	69.2	82.7	76.2	.84	.79	.81	.83	-0.71	-1.64	-0.58	0.10	2.54	-0.14	.78	.52	.77	.78
13	3	.69	.53	.61	.60	62.6	49.4	75.4	.84	.75	.87	.89	-0.47	0.01	-0.99	-0.32	-1.05	0.09	.75	.60	.65	.65
14	3	.80	.68	.76	.78	65.9	56.2	68.8	.81	.70	.83	.85	-0.62	-0.13	-0.34	-0.14	-1.31	-0.44	.83	.83	.83	.83
15	3	.71	.61	.73	.75	78.6	80.4	79.3	.84	.73	.84	.86	-1.32	-1.17	-0.85	2.44	0.99	0.18	.82	.62	.81	.81
16	3	.75	.45	.75	.76	75.6	84.1	74.1	.83	.78	.83	.86	-1.01	-1.70	-0.72	1.18	3.10	-0.04	.85	.45	.83	.82
17	3	.55	.58	.65	.67	57.5	58.0	62.8	.88	.74	.85	.87	-0.32	-0.26	-0.32	-0.68	-1.33	-0.51	.58	.74	.70	.71
18	4	.41	.41	.41	.37	61.2	75.9	82.1	.68	.53	.66	.84	-0.37	-1.15	-0.81	-0.78	0.34	0.38	.32	.68	.53	.36
19	4	.49	.44	.53	.50	69.7	75.0	81.2	.61	.50	.59	.83	-0.80	-1.17	-1.01	0.38	0.59	1.02	.38	.71	.68	.49
20	4	.48	.31	.46	.53	79.4	85.9	76.5	.62	.59	.64	.83	-1.20	-1.89	-0.90	1.54	3.25	0.01	.79	.27	.58	.57
21	4	.53	.41	.52	.65	77.4	77.6	81.0	.59	.53	.59	.81	-0.96	-1.21	-0.76	0.77	0.94	0.04	.86	.38	.64	.69

Note. The item numbers correspond to those in table 19. Subscale 1 = 'Intent to persist'; Subscale 2 = 'Identification'; Subscale 3 = 'long-term goals'; Subscale 4 = 'Desire'; S1 = study 1 (N = 471 undergraduate students); S2 = study 2 (N = 274 Brazilian private school students); S3 = study 3 (N = 278 adolescent soccer player); S3<sub>new</sub> = new item set of study 3; *r* = discriminatory power in reference to respective subscale; *p* = item difficulty,  $\alpha$  = Cronbach's alpha for the respective subscale if item was deleted, *S* = Skewness, *C* = Curtosis,  $\beta$  = standardized factor loading of the item on the respective subscale.

Table 24

*Formulation and psychometric properties for the new items of the com.pass scale in study 3*

Item no.	Sub-scale	<i>r</i>	<i>p</i>	$\alpha$	<i>S</i>	<i>C</i>	$\beta$
22	1	.663	79.6	.862	-.791	.218	.688
23	2	.612	85.2	.847	-1.020	.629	.672
24	3	.678	76.8	.870	-.822	-.114	.726
25	4	.714	75.9	.803	-.368	-.751	.829
26	1	.506	73.2	.872	-.465	-.802	.568
27	4	.656	81.4	.813	-.628	-.164	.687
28	1	.712	66.4	.856	-.209	-.846	.770
29	4	.563	66.6	.824	-.244	-.731	.640
30	1	.671	61.0	.859	-.139	-.729	.736
31	4	.641	71.2	.812	-.393	-.807	.766

Note. *r* = discriminatory power in reference to respective subscale; *p* = item difficulty,  $\alpha$  = Cronbach's alpha for the respective subscale if item was deleted, *S* = Skewness, *C* = Curtosis,  $\beta$  = standardized factor loading of the item on the respective subscale.

Table 25

*Item formulation for the German, Portuguese and English version of the dual model passion scale (Vallerand et al., 2003)*

Item no.	German item set	Item formulation Brazilian Portuguese item set	English item set (from Vallerand et al., 2003)
1	Diese Aktivität ermöglicht mir, eine Vielfalt an Erfahrungen zu erleben	Esta atividade me permite viver uma variedade de experiências.	This activity allows me to live a variety of experiences.
2	Neue Dinge, die ich durch diese Aktivität entdecke, erlauben mir, diese Aktivität noch mehr wertzuschätzen.	As coisas novas que eu descobro através desta atividade me fazem valorizar esta atividade ainda mais.	The new things that I discover with this activity allow me to appreciate it even more.
3	Der Drang ist so stark. Ich kann mir nicht helfen, ich muss diese Aktivität ausüben.	A vontade é tão forte que eu não consigo deixar de fazer esta atividade.	The urge is so strong. I can't help myself from doing this activity.
4	Ich bin emotional von dieser Aktivität abhängig.	Eu dependo emocionalmente desta atividade.	I am emotionally dependent on this activity.
5	Diese Aktivität ermöglicht es mir, unvergessliche Erfahrungen zu erleben.	Esta atividade me permite viver experiências inesquecíveis.	This activity allows me to live memorable experiences.
6	Diese Aktivität zeigt mir Qualitäten auf, die ich an mir mag.	Esta atividade me mostra as qualidades que eu gosto em mim mesmo.	This activity reflects the qualities I like about myself.



Table 25 (continued)

*Item formulation for the German, Portuguese and English version of the dual model passion scale (Vallerand et al., 2003)*

Item no.	German item set	Item formulation Brazilian Portuguese item set	English item set (from Vallerand et al., 2003)
7	Ich habe Schwierigkeiten mein Bedürfnis, diese Aktivität auszuüben, zu kontrollieren.	É muito difícil controlar a minha vontade de praticar essa atividade.	I have a tough time controlling my need to do this activity.
8	Diese Aktivität steht in Harmonie zu anderen Tätigkeiten in meinem Leben.	Esta atividade está em harmonia com outras atividades na minha vida.	This activity is in harmony with the other activities in my life.
9	Für mich ist diese Aktivität eine Leidenschaft, die ich kontrollieren kann.	Para mim, esta atividade é uma paixão que eu consigo controlar.	For me it is a passion, that I still manage to control.
10	Ich habe Schwierigkeiten dabei, mein Leben ohne diese Aktivität zu managen.	Tenho dificuldade de imaginar a minha vida sem essa atividade.	I have difficulty imagining my life without this activity.
11	Ich bin von dieser Aktivität vollkommen vereinnahmt.	Estou completamente dominado por essa atividade.	I am completely taken with this activity.
12	Ich kann nicht ohne diese Aktivität leben.	Eu não posso viver sem essa atividade.	I cannot live without it.
13	Ich verspüre nahezu einen Zwang, diese Aktivität auszuüben.	Eu quase sinto uma obsessão em praticar essa atividade.	I have almost an obsessive feeling for this activity.
14	Meine Stimmung ist davon abhängig, ob ich diese Aktivität ausüben konnte.	Meu humor depende de eu poder realizar esta atividade	My mood depends on me being able to do this activity.
15	Ich verbringe sehr viel Zeit mit dieser Aktivität.	Eu dedico muito tempo a esta atividade.	I spend much time with this activity.
16	Ich mag diese Aktivität.	Eu gosto desta atividade.	I like this activity.
17	Diese Aktivität ist mir wichtig.	Esta atividade é importante para mim.	This activity is important to me.
18	Diese Aktivität ist meine Leidenschaft.	Esta atividade é a minha paixão.	This activity is my passion.

Note. Only the German and Portuguese versions were used in this article. The English version is only reported for documentation purposes. For the item-subscale assignment see Table 26.

Table 26

*Item formulation and properties for dual model passion scale (Vallerand et al., 2003) in the studies 1, 2 and 3*

Item no.	Sub-scale	<i>r</i>			<i>p</i>			$\alpha$			<i>S</i>			<i>C</i>			$\beta$		
		S1	S2	S3	S1	S2	S3	S1	S2	S3	S1	S2	S3	S1	S2	S3	S1	S2	S3
1	1	0.643	0.553	0.775	79.3	84.6	75.0	0.647	0.629	0.868	-1.206	-1.596	-0.450	1.152	2.021	0.096	0.824	0.829	0.858
2	1	0.617	0.555	0.778	78.8	84.6	73.6	0.653	0.633	0.867	-1.337	-1.614	-0.626	1.982	2.551	0.414	0.783	0.681	0.854
3	2	0.575	0.564	0.82	61.7	71.3	56.7	0.835	0.857	0.915	-.371	-0.898	-0.199	-.238	-0.343	-1.022	0.655	0.605	0.849
4	2	0.719	0.697	0.846	57.3	54.4	56.1	0.812	0.839	0.913	-.224	-0.121	-0.219	-.913	-1.383	-0.967	0.78	0.747	0.881
5	1	0.673	0.572	0.698	74.9	75.1	78.4	0.629	0.609	0.876	-1.032	-1.088	-0.881	.322	0.085	0.66	0.772	0.758	0.753
6	1	0.548	0.449	0.745	73.5	72.8	75.2	0.67	0.647	0.87	-.878	-0.941	-0.783	.447	0.131	0.666	0.587	0.457	0.78
7	2	0.438	0.628	0.803	27.8	61.7	46.9	0.851	0.849	0.917	.603	-0.403	0.060	-.254	-1.093	-1.22	0.478	0.673	0.852
8	1	0.341	0.322	0.621	74.6	67.9	74.0	0.717	0.682	0.885	-.826	-0.729	-0.980	.395	-0.683	0.992	0.354	0.262	0.631
9	1	0.142	0.253	0.622	76.2	70.3	76.5	0.756	0.699	0.885	-.968	-0.933	-0.718	1.436	-0.175	-0.088	0.17	0.267	0.638
10	2	0.682	0.604	0.788	39.3	68.3	53.9	0.818	0.852	0.918	.377	-0.839	-0.102	-1.019	-0.549	-1.117	0.737	0.658	0.813
11	1	0.178	0.269	0.645	26.3	45.2	65.4	0.761	0.707	0.887	.790	0.202	-0.514	-.067	-1.41	-0.389	0.232	0.292	0.678
12	2	0.673	0.697	0.735	48.1	50.9	68.7	0.82	0.839	0.923	.018	-0.049	-0.710	-1.371	-1.378	-0.462	0.752	0.761	0.752
13	2	0.697	0.696	0.873	33.0	43.3	52.9	0.816	0.839	0.909	.538	0.259	-0.095	-.719	-1.28	-1.204	0.742	0.768	0.92
14	2	0.494	0.582	0.568	47.7	48.4	54.5	0.846	0.855	0.937	-.061	0.000	-0.114	-.890	-1.353	-0.73	0.539	0.641	0.585
15	3	0.283	0.194	0.635	68.7	58.8	76.0	0.595	0.586	0.859	-.652	-0.296	-0.673	.241	-1.209	0.048	n.r.	0.213	0.68
16	3	0.389	0.341	0.633	94.8	91.9	89.4	0.527	0.459	0.844	-3.274	-2.455	-1.918	18.919	7.162	3.345	n.r.	0.61	0.716
17	3	0.564	0.459	0.82	92.0	89.8	77.3	0.407	0.365	0.77	-2.132	-2.186	-1.059	7.753	7.655	0.02	n.r.	0.691	0.92
18	3	0.387	0.425	0.784	74.9	73	82.2	0.507	0.279	0.771	-.831	-0.986	-1.184	.168	-0.19	0.625	n.r.	0.662	0.86

Note. Subscale 1 = harmonious passion; Subscale 2 = obsessive passion; Subscale 3 = general passion criteria; S1 = study 1 (N = 471 undergraduate students); S2 = study 2 (N = 274 Brazilian private school students); S3 = study 3 (N = 278 adolescent soccer player); S3new = new item set of study 3; *r* = discriminatory power in reference to respective subscale; *p* = item difficulty,  $\alpha$  = Cronbach's alpha for the respective subscale if item was deleted, *S* = Skewness, *C* = Curtosis,  $\beta$  = standardized factor loading of the item on the respective subscale; n.r. = not reported because of negative residual variance ('Heywood case').

Table 27

*Suggestion for a short version of the com.pass scale*

Subscale	$\alpha_{S1}$	$\alpha_{S2}$	$\alpha_{S3n}$	Item
1. Intent (commitment)	.710	.522	.806	Each day I look after having enough opportunities to dedicate myself to this activity. I try to plan my everyday life in order to have as much time as possible for this activity.
2. Goals (commitment)	.728	.812	.750	This activity shall play an outstanding role in my future. I have many personal goals that have to do with this activity.
3. Identification (commitment)	.854	.682	.797	I strongly identify with this activity. This activity belongs close to me. Without this activity, I would not be myself.
4. Desire	-	-	.817	This activity is an intense experience for me. I often feel a strong urge to do this activity. When I do this activity, I am full of energy. I frequently feel an urging desire to do this activity.

Note.  $\alpha$  = Cronbach's  $\alpha$ , S1 = study 1 (N = 471 undergraduate students); S2 = study 2 (N = 274 Brazilian private school students); S3n = study 3 (N = 278 adolescent soccer player; new item set; Response scale for the com.pass scale: 1 = do not agree at all to 6 = totally agree. The commitment subscale is computed as mean of the subscales 1 to 3. This commitment subscale was reliable in all three studies ( $\alpha_{S1} = .809$ ;  $\alpha_{S2} = .709$ ;  $\alpha_{S3n} = .859$ ). For the short version of the com.pass scale, the items with the best psychometric properties in Study 3 were selected. To date, only the psychometric properties of the German item versions are known. The here suggested English version still has to be tested.

**Paper 3: Moeller, J., Keiner, M., Wächter, D. (in prep.). A disposition for passion? On the relationship of passion with facets of personality. Manuscript in preparation.**

**Abstract**

This article investigates the relation of passion for activities to specific personality facets and non-substance related dependency. According to most psychological definitions, passion describes a stable inclination of a person toward an activity. Individuals with passion for a specific activity persistently like that activity, continuously desire to engage in this activity, and often develop symptoms of dependency from that activity. Previous studies have shown that the degree of experienced passion is partially determined by person-specific characteristics, but the few studies to address the relation between passion and personality traits remained on the abstract level of broad personality factors.

This is the first study to address relations between passion and specific personality facets. Links between different measures for passion, several facets of extraversion, and aspects of dependency were investigated in five cross-sectional studies ( $N_{\text{total}} = 806$ ) with variable-centered and person-oriented approaches.

Passion was positively correlated with the facets sensitivity to reward, high arousal positive affectivity, trait cheerfulness and different aspects of dependency, but unrelated to sensation seeking. In multilevel analyses with individuals nested in activity types, inter-individual differences accounted for 45% to 57% off the observed variance in passion. Person-oriented analyses revealed two clusters with high vs. low scores in passion, reward sensitivity and positive trait affectivity which was replicated across different activity contexts.

Keywords: passion, personality facets, sensitivity to reward, trait affectivity, dependency

## Introduction

This article reports findings from five studies about the relation between passion for activities to specific facets of personality. In the theoretical part, we first discuss the relation of general passion to general factors of personality. Going more into detail, we then discuss links between specific aspects of passion (liking, approach motivation and non-substance-related dependency) with specific personality facets (sensitivity to reward, impulsive sensation seeking, and trait affectivity including trait cheerfulness), which are all related to extraversion as lower-order facets or correlates.

In the empirical part, we investigate the correlations between passion, the above mentioned personality facets, and non-substance related dependency in different domains and with different measures. Additionally, in order to substantiate the expected link between passion and personality traits, we disentangle person-specific and activity-specific determinants of passion in multilevel analyses. For the same purpose, we investigate in person-oriented analyses<sup>10</sup> which aspects of passion distinguish between homogeneous groups and account for inter-group differences in dispositional liking and approach motivation.

## The Previous Research

### What is passion?

Passion for activities is a relatively new construct in the psychological literature on motivation. Most explicit passion definitions agree in conceptualizing passion as a long-lasting inclination of a person towards an activity that is characterized by hedonic experiences (e.g. liking), strong approach motivation and long-term behavioral persistence (Cardon, Wincent, et al., 2009; Fredricks et al., 2010; Renzulli et al., 2006; Vallerand et al., 2003).

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<sup>10</sup> For the distinction between person-oriented and variable-centered approaches, see Bergmann & Magnusson (1997).

Thus, passion is a concept that bridges short-term motivational intensity with long-term commitment (Moeller & Grassinger, 2013).

Recently, three different but overlapping definitions of passion have been proposed: Vallerand et al. (2003) define passion as an inclination of a person toward an activity that the person likes, finds important, invests time and energy in and which the person identifies with. The authors differentiate between 1) the adaptive harmonious passion, which is characterized by positive emotions, autonomous decision taking, and maintained control over the activity, and 2) the maladaptive obsessive passion, which is characterized by negative emotions and the loss of control over an activity. This dual model of passion has been extensively studied during the last decade. The authors define the hedonic experience ‘liking’ as an essential component of passion, but add that passion also implies desire, i.e. approach motivation (Philippe, Vallerand, & Lavigne, 2009; Vallerand et al., 2003).

Fredricks et al. (2010) proposed a definition according to which individuals are passionate about an activity if they want to do the activity all the time, devote much time and energy to it, get completely involved, experience flow and emotional release through the activity and see their identity in terms of the activity. This definition emphasizes more the desire (‘wanting’), but includes also intrinsic, i.e. affectively positive experiences, e.g. flow.

A third model of passion was proposed by Moeller and Grassinger (2013), who conceptualize passion as the coincidence of desire with commitment. The authors subdivide commitment into the components 1) continuous intentions to persist, 2) long term goals and 3) identification with the activity and specify that desire refers to strong approach motivation of mainly but not necessarily positive valence. Moeller and Grassinger’s com.pass model of passion resulted from a comprehensive review of literature, and the authors state that this model integrates core features of previous psychological passion concepts, including the definition from Fredricks et al. (2010) and Vallerand et al. (2003).

According to the above described definitions, passion bridges short term affective experiences with long-term engagement, and corresponds to both hedonic experiences and approach motivation.

#### Links between measures of passion and personality traits

Since passion is described as a stable disposition of a person to engage and persist in particular types of activities (Moeller, Dietrich, et al., in prep.; Philippe et al., 2010; Vallerand, et al., 2003), passion is likely to be influenced by characteristics of the person, the activity, and by interactions between person-specific and activity-specific determinants. It has been found that about 20% of the variance in momentary experiences of passion are due to person-specific determinants, and that the individual likelihood to have many versus few passionate experiences in everyday life situations remains relatively stable across a period of years during adolescence (Moeller, Dietrich, et al., in prep.).

Only few cross-sectional studies have addressed more specifically the relation of passion to stable personality traits. First evidence for links between passion (in terms of Vallerand et al.'s definition) and the big five personality traits was reported by Wang and Yang (2008), who found that openness to experience, agreeableness and conscientiousness were related to passion for online shopping activities. These findings were corroborated by Balon, Lecoq, and Rimé (2013), who found that harmonious passion was positively correlated with conscientiousness, extraversion, agreeableness and openness, whereas obsessive passion was negatively related to agreeableness (all effect sizes were small). Moreover, in their study on links between Eysenckian personality traits and passion for internet activities, Tosun and Lajunen (2009) found that psychoticism was positively related to both harmonious and obsessive passion, whereas extraversion was related to harmonious passion and neuroticism was unrelated to passion for internet activities. More specific personality dispositions and their link to passion were studied by Vallerand et al. (2006), who assumed that the disposition

to act more or less autonomously influenced the type of experienced passion. The authors found that, as predicted by the dual model of passion, autonomous personality orientation correlated with harmonious passion and controlled personality orientation correlated with obsessive passion.

Due to the paucity of studies on the relation of passion to personality traits, many questions remain open. All existing studies concern the dual model of passion (Vallerand et al., 2003). As a consequence, most previous studies limit their focus on differences between the harmonious and obsessive type of passion and do not address differences between high versus low passion (Balon et al., 2013; Tosun & Lajunen, 2009). However, Wang et al. (2008) found in a person-oriented approach that the degree rather than the type of passion differentiated between homogeneous groups, i.e. that most individuals have high, or low, scores in both harmonious and obsessive passion. These findings were replicated by Moeller and Grassinger (in prep.) in three studies addressing different activity contexts and with different measures of passion. These findings indicate that inter-individual differences in the general degree of passion (high versus low) might be more relevant for the study of passion-related personality traits than the distinction between harmonious and obsessive passion.

Another limitation of most previous studies is their focus on abstract personality dimensions like the big five personality factors, and their disregard of more specific level of personality facets. This approach might be too abstract, because correlations on the level of abstract personality factors are generally smaller and less informative than correlations on the level of facets (e.g. Armstrong & Anthony, 2009; Beauducel, Liepmann, Felfe, & Nettelnstroth, 2007; Bipp, Steinmayr, Spinath, 2008; Schimmack, Oishi, Furr, & Funder, 2004). The investigation of links between passion and specific personality facets would allow for more specific conclusions about the causes underlying the investigated correlations. For example, to date it is unclear what we learn from the rather small correlation between harmonious passion and the big five personality dimension extraversion (Balon et al., 2013).



This correlation could indicate links between harmonious passion and the facets of extraversion that refer to positive affectivity, or they could imply links between harmonious passion and the social aspects of extraversion, or links to one or more of the other facets of extraversion, e.g. excitement-seeking, activity, or assertiveness. If these facets of extraversion were disentangled, then more specific hypotheses about the mechanisms underlying the correlation between passion and personality could be tested.

For example, Tosun and Lajunen (2009) assume that the facet sensation seeking could account for the links between passion, extraversion and dependency. This causal interpretation could easily be tested if the extraversion facet ‘excitement seeking’ was assessed, but the authors solely studied extraversion on the factor level, so the assumption remains speculative. Likewise, Balon et al. (2013) reported hypotheses about the link between passion and specific facets of personality (e.g. the extraversion facet ‘positive affects’), but investigated this link only on the level of abstract big five personality factors, which is no conclusive test for the specific hypotheses.

In sum, passion is expected to be influenced by personality traits, and several specific hypotheses concerning the relation of passion to personality facets have been discussed. However, these specific assumptions were not tested yet.

Aspects of passionate motivation and their relation to specific facets of personality

Taking into account these critiques, we discuss in the following how and which specific aspects of passion might be linked to facets of extraversion. Passion is a multi-faceted construct and not all of its aspects can be addressed in this article. We limit this study to the characteristics of passion as 1) steady experience of positive affect in an activity (Cardon, Wincent et al., 2009; Fredricks et al., 2010; Vallerand et al., 2003), 2) persistent desire towards an activity (Moeller & Grassinger, 2013), and 3) its similarity to symptoms of non-substance related dependency (Reynaud, Karila, Blecha, Benyamina, 2010; Vallerand et

al., 2003; Wang & Yang, 2007). There are more aspects of passion, for instances behavioral persistence in the face of aversive experiences, and identification with an activity, but these are beyond the scope of this article.

According to most definitions, passion is characterized both by persistent approach motivation and hedonic experiences regarding the relevant activity. Although approach motivation and hedonic experiences often coincide, they are functionally independent of each other (Berridge, 2007; Berridge, Robinson, & Aldridge, 2009; Watson & Tellegen, 1985). By definition, hedonic experiences ('liking') are experiences of positive affect, the corresponding arousal (affect intensity) may be low or high. In contrast, approach motivation ('wanting') is typically accompanied by high arousal affect, but the affective valence can be negative. For instances, measures of approach motivation were found to be related both to positive emotions and to anger (Harmon-Jones, Harmon-Jones, Abramson, & Peterson, 2009; Harmon-Jones & Harmon-Jones, 2010). Thus, approach motivation can come along with any emotional valence, but it is essentially an intense, i.e. high arousal emotional experience. This difference between 'liking' and 'wanting' is important, because both experiences correspond to different causal determinants and behavioral consequences (Berridge, 2007; Davis, et al., 2009; see further discussions below). Therefore, aspects of 'liking' and 'wanting' are distinguished in this article.

#### *The experience of wanting and corresponding personality facets*

The synonyms wanting, incentive motivation and motivational intensity all describe the desire for reward-related stimuli. They describe approach motivation accompanied by feelings of high arousal affect and urging gravely (Brehm & Self, 1989; Berridge, 2007). The valence of the experienced affect of desire can be positive or negative (Friedman & Förster, 2011; Ortony & Turner, 1990; Harmon-Jones et al., 2009). Wanting triggers the intention to approach corresponding goals, the mental preparation of instrumental behavior and action

plans for the goal pursuit, and behavioral attempts to overcome obstacles that might hinder the approach of the desired stimulus (Salamone & Correa, 2002).

Individuals differ in their dispositional sensitivity to reward-related cues and thus in their likelihood to experience and show approach motivation towards reward-related stimuli (Gray, 1981). Dispositional sensitivity to reward has been discussed to be “the main source of individual differences in extraversion” (Depue & Collins, 1999, p. 495). Sensitivity to reward is seen as a function of the Behavioral Approach System (Gray, 1981).

Another personality trait related to approach motivation is ‘activation’, also a facet of extraversion (see Depue & Collins, 1999 for an overview). Activation depicts traits like liveliness, talkativeness, energy level, and activity level.

A third personality trait closely related to dispositional approach motivation is sensation seeking. Sensation seeking is a multidimensional construct including dispositional impulsivity, thrill and adventure seeking, risk taking, novelty seeking, and boredom susceptibility (Zuckerman, Eysenck, & Eysenck, 1978). Sensation seeking has also been linked to extraversion as a lower-order facet (Eysenck & Eysenck, 1985), but there is an ongoing controversy about the exact relation between both constructs (see Depue and Collins, 1999, for an overview).

#### *The experience of liking and corresponding personality facets*

The second passion characteristic, ‘liking’, refers to hedonic experiences, i.e. positive emotions, which may be of high or low intensity (Berride, 2007; Davis et al., 2009).

Individuals differ from each other in their disposition to experience more or less positive emotions (i.e. liking experiences) in their everyday life (e.g. Schimmack et al., 2004). The corresponding personality trait is called positive trait affectivity (Watson, 2002), which is another facet of extraversion (Costa & McCrae, 1980; 1984; Watson & Clark, 1997). Closely related is the construct trait cheerfulness, which is a stable disposition to have hedonic

experiences, equivalent to the extraversion facet positive emotions (Goldberg, et al., 2006), and which is one of the best personality predictors for life satisfaction (Schimmack et al., 2004).

*The experience of passionate non-substance related dependency and corresponding personality facets*

Besides liking and wanting, a third characteristic of passion to activities is the construct's similarity to the concept of non-substance related dependency, which is a form of dependency not from substances, but from activities such as e.g. gambling, shopping, internet gaming, or sport exercises. Particularly the obsessive type of passion shares central characteristics with non-substance related dependency. Both experiences are characterized by “(1) craving state prior to behavioral engagement, or a compulsive engagement; (2) impaired control over behavioral engagement; and (3) continued behavioral engagement despite adverse consequences” (for dependency, see Potenza, 2006, p. 143; for passion, see Vallerand et al., 2003). Dependency generally implies a strong approach motivation or ‘wanting’ (see Berridge, 2007 for an overview), in which it is similar to the general concept of passion according to Moeller and Grassinger (2013). Like obsessive passion but unlike harmonious passion, dependency does not refer to hedonic experiences, but comes along with experiences of anhedonia, aversion and negative affect (Wang et al. 2001, Wang, Volkow, Thanos, & Fowler, 2004; Vallerand et al., 2003). In line with these conceptual similarities, the obsessive passion scale contains items that tap loss of control over an activity and was found to correlate with symptoms of dependency on the respective activity (Vallerand et al., 2003; Ratelle et al., 2004). One central component of any form of dependency is the loss of control (see above). Scales for the assessment of non-substance related dependency usually concern specific activity contexts, such as ‘internet addiction’ (Hahn & Jerusalem, 2010) or ‘exercise addiction in sport’ (Terry, Szabo, & Griffith, 2004).

Important for this article, non-substance related dependency is related to several personality facets that were discussed above as possible correlates of passionate approach motivation. First, substance-related dependency is positively correlated with the personality trait reward sensitivity (Davis, et al., 2007; Kreek, Nielson, Butelman, LaForge, 2005). Specifically, the dependency facet loss of control has been related to reward responsiveness (Davis et al., 2008). Second, both substance-related and non-substance related dependencies are positively correlated with the personality facet sensation seeking (Hittner & Swickert, 2006; Mehroof & Griffiths, 2010). Tosun and Lajunen (2009) discussed that this link between sensation seeking and dependency could ‘explain’ observed correlations between passion, extraversion and dependency.

In sum, the specific personality facets sensitivity to reward, positive trait affectivity, and sensation seeking are expected to be positively correlated with passion. Passion is expected to be positively correlated with symptoms of non-substance related dependency. Moreover, the personality facets sensitivity to reward and sensation seeking are expected to be positively correlated with dependency.

We expect that the link between personality traits and activity-related dependency is at least partially mediated by passion. We expect that the disposition to react more sensitive to reward, or to seek stimulation only leads to dependency from a particular activity if the individual engages intensively and persistently in an activity that facilitates the experience of reward and stimulation. The more intensely a person is inclined to engage in an activity, and the more compulsory motives the individual has to persist in the activity, the higher will be the individual’s likelihood to lose control, to persist despite negative consequences, i.e. to develop symptoms of non-substance related dependency. In line with these assumptions, we expect that the link between personality facets and non-substance related dependency will be mediated by passion.

### Hypotheses

Because of the above documented literature, we expect that the degree of experienced passion is related to personality traits. Our hypotheses are detailed below.

#### *Passion and liking (hedonic experiences)*

1. We expect positive correlations between positive trait affectivity and all measures of passion.
2. Positive correlations between trait cheerfulness and all measures of passion.

#### *Passion and wanting (approach motivation)*

3. Positive correlations between sensitivity to reward and all measures of passion.
4. Positive correlations between passion and trait affectivity measures that tap approach motivation and high arousal affect. Particularly strong correlations are expected between these measures of trait affectivity and the passion component 'desire'.
5. We expect positive correlations between impulsive sensation seeking and measures of general passion. Particularly strong correlations are expected between impulsive sensation seeking and obsessive passion.

#### *Passion and non-substance related dependency*

6. We expect positive correlations between measures of dependency and measures of the general degree of passion. Particularly strong correlations are expected between dependency and obsessive passion.
7. We expect positive correlations between measures of dependency from an activity and measures of a) impulsive sensation seeking and b) sensitivity to reward.
8. We expect that the hypothesized link between personality traits and measures of dependency of an activity is mediated by the degree of passion for this activity.

*Additional analyses regarding determinants for inter-individual differences in passion*

9. We expect that the general degree rather than specific types of passion account for inter-individual differences in passion, trait approach motivation and positive trait affectivity, and that this can be shown in a person-oriented approach.
10. We expect that the activity context partially determines the individual degree of passion, but that person-specific determinants account for the higher proportion of inter-individual differences in passion.

**Methods and Results**

The links between different measures for passion and personality facets were investigated in five studies with a total of 806 participants. The results regarding the relationship of passion to reward sensitivity, trait affectivity, and measures of dependency were investigated in at least two studies and replicated across different domains. The following table gives an overview about all studies of this article.

Table 28

*Overview about the studies in this article*

Study	Research Question	Sample domain & assessment	N	Instruments
1	Relation of passion for sport to reward sensitivity and exercise dependency	Amateur dancers, paper-& pencil assessment	149	Passion scales <sup>a,b</sup> , BIS/BAS scale <sup>c</sup> , EAI
2	Replication of study 1 in another sport context	Amateur martial arts practitioners, paper-& pencil assessment	95	Passion scales <sup>a,b</sup> , BIS/BAS scale <sup>c</sup> , EAI <sup>e</sup>
3	Replication of studies 1-2, additional: relation of passion to impulsive sensation seeking	Leisure poker player, online assessment	98	Passion scales <sup>a,b</sup> , BAS scale <sup>c</sup> , Impulsive sensation seeking scale <sup>f</sup> , Loss of control scale <sup>g</sup>
4	Relation of passion to reward sensitivity and trait affectivity	Youth leisure soccer player, online and paper-& pencil assessment	278	Passion scales <sup>a,b</sup> , BAS scale <sup>c</sup> , PANAS <sup>d</sup>
5	Relation of passion across domains to an alternative measure of trait affectivity and trait cheerfulness	Undergraduate students, passion was assessed across domains with paper-& pencil assessment	206	Passion scales <sup>a,b</sup> , affect scale <sup>i</sup> , STHI-60-T <sup>h</sup> ,

Note. Instruments: <sup>a</sup> = com.pass scale (Moeller & Grassinger, in prep.); <sup>b</sup> = Dual Model Passion Scale

(Vallerand et al., 2003); <sup>c</sup> = BIS/BAS scale (Strobel, Beauducel, Debener & Brocke, 2001); <sup>d</sup> = Positive Negative

Affect Schedule (PANAS; Krohne, Egloff, Kohlmann, & Tausch, 1996); <sup>e</sup> = Exercise Addiction Inventory (EAI;

Terry et al., 2004); <sup>f</sup> = impulsive sensation seeking, subscale from the Zuckerman-Kuhlman-Personality

Questionnaire (ZKPQ-50-CC, Aluja et al., 2006); <sup>g</sup> = loss of control, subscale from the "Internetsuchtskala"

(IAS: Internet Addiction Scale; Hahn & Jerusalem, 2010); <sup>h</sup> = State-Trait-Cheerfulness-Inventory -60 -Trait

version (STHI-60-T; Ruch et al., 1996; 1997); <sup>i</sup> = Affect scale (Kessler & Staudinger, 2009).

The relation of passion to personality facets and dependency was investigated in each of these studies separately. Additionally, several datasets were merged together for the study of differences between activity contexts and for person-oriented analyses that required larger sample sizes.

The specific activity contexts in the studies one to four (dance, martial arts, poker, and soccer) were chosen because of the following reasons: 1) The activities should allow the



experience of passion and non-substance related dependency. Sport, Music, their combination in dance and addictive gambling games like poker were described as often passionately experienced activities (see e.g. Moeller & Grassinger, in prep.; Moeller, Dietrich, et al., in prep.; Vallerand et al., 2003; Ratelle et al., 2004). Dependency from activities has been described for gambling like poker (American Psychiatric Association, 2013), as well as for sports (Terry et al., 2004). 2) In order to achieve big enough sample sizes, we chose activities which are done by many people: Sport- and music-related leisure activities are among the most frequent famous leisure activities, particularly soccer is a sport for the masses in Germany where the studies were conducted. 3) In order to avoid eventual gender biases, we included sports that are more often done by men (martial arts and soccer, study two and study four) and on which is done more often by women (dance, study one). We also balanced individual sports (dance, martial arts) and team sports (soccer). 4) With the adolescents in study four, the university students in study five, and adults in the studies one to three we studied individuals of different ages in order to avoid age effects.

### Study 1

The first study investigated the relation of two passion scales to reward sensitivity (the BAS) and symptoms of non-substance related dependency.

#### *Participants and procedure*

N = 128 leisure dancers were surveyed with paper and pencil questionnaires in their dancing schools. 56.6% were female, the mean age was: 26.85 (SD = 13.0). On average, the participants had practiced dance for 7.75 years.

#### *Measures*

Passion was assessed with two measures: the com.pass scale (Moeller & Grassinger, in prep.), and a German version of the dual model passion scale (Vallerand et al., 2003; German translation by Moeller & Grassinger, in prep.). The com.pass scale measures consists

of 21 items and four subscales ('continuous intent to persist', 'identification', 'long-term goals', and 'motivational intensity'), of which the first three are averaged to the commitment subscale. The passion score of the com.pass scale is computed as the mean of the fourth subscale motivational intensity and the commitment subscale. All items are responded on a Likert scale from 1 = *do not agree at all* to 6 = *totally agree*.

The passion scale from Vallerand et al. (2003) corresponds to the dual model of passion (ibid.). Three subscales measure the general degree of passion (4 items), harmonious passion (7 items) and obsessive passion (7 items), respectively. All items are responded on a Likert scale from 1 = *do not agree at all* to 7 = *completely agree*. In the following, the com.pass passion score and the 4-item subscale from Vallerand et al. are addressed as 'general measures of passion', whereas the subscales for harmonious and obsessive passion are addressed as 'types of passion'.

Sensitivity to reward was assessed with the BAS scale of the BIS/BAS scale from Carver and White (1994). In this study, we used the German translation of this scale from Strobel et al. (2001). Originally, the BIS/BAS scale consists of four subscales: one assessing behavioral inhibition (BIS), and three assessing aspects of behavioral approach (BAS), namely the subscale reward responsiveness (RR), which is the closest measure for sensitivity to reward, the subscales drive (D), and fun seeking (FS). The response scale ranges from 1 = *very true for me* to 4 = *very false for me*<sup>11</sup>. Since Strobel et al. (2010) found that a bifactorial solution with a global BAS and a BIS scale fitted their data best, we report results for the global BAS score in Table 29.

Non-substance related dependency regarding dance activities was assessed with the 6-item Exercise Addiction Inventory (EAI, Terry et al., 2004). The scale was translated in a

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<sup>11</sup> In our studies, the polarity of the BIS/BAS scale was reversed in line with the polarity of the other scales, so that low scores reflected low degrees in BIS / BAS.

forth-and-back translation process by students of translation studies (5<sup>th</sup> semester) and native English speakers. The response scale ranges from 1 = *strongly disagree* to 5 = *strongly agree*.

### *Analyses*

Table 29 gives an overview about descriptive statistics of the applied measures and Pearson correlations among them. Robust Pearson correlations were computed additionally in order to avoid misinterpretations that might have resulted from the facts that some of the scales had outliers and / or deviated from normal distribution. For the robust correlations, outliers of all scales were removed via winsorization; meaning the 10% most extreme values at each end of the distribution were replaced by the closest non-outlying value. Then, robust confidence intervals and significance tests for Pearson's  $r$  were computed with the statistical program R (using RStudio version 0.97.551, function: `pcorhc4`, package: WRS). The R function 'pcorhc4' applies the 'HC4 method' for the estimation of standard errors and is used to calculate Pearson correlations that are robust to heteroskedasticity and violations of normal distribution even in small samples (Wilcox, 2012b).

The assumed mediation of the effect of reward sensitivity on dependency by passion was tested in a manifest mediation analysis (see Figure 5). The analysis was run in Mplus, version 6 (Muthén & Muthén, 2008-2011). Separated analyses were conducted for each passion measure (general passion according to the *com.pass* model and the dual model of passion, HP & OP).

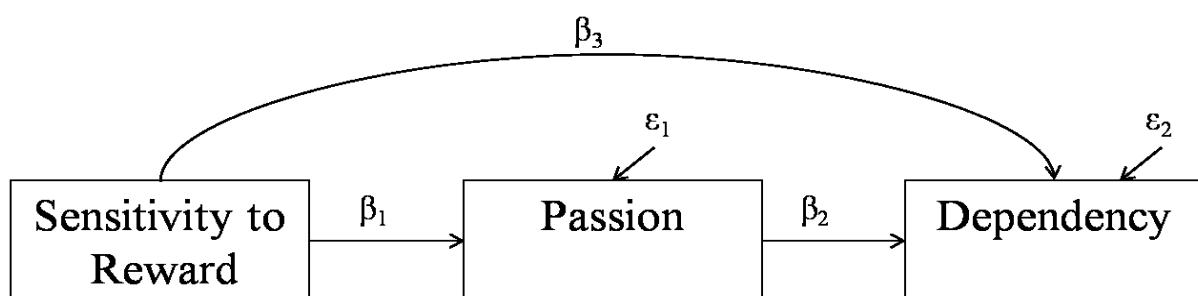


Figure 5: Mediation analysis for the mediation of the effect of sensitivity to reward on dependency in dance by passion

*Results and discussion*

*Passion and reward responsiveness.* All measures of passion were positively correlated with the BAS. The corresponding effect sizes for the different passion measures range from  $.36 \leq r \leq .60$ .

*Passion and dependency.* General passion in terms of the com.pass model and Vallerand's four passion criteria was strongly and positively correlated to dance-related exercise dependency. Of all passion measures, the com.pass passion score and obsessive passion were most strongly related to the exercise addiction inventory ( $r_{\text{zero order}} \geq .63$ ). The fact that obsessive passion is more strongly than harmonious passion related to dependency is consistent with the hypotheses and the dual model of passion (Vallerand et al., 2003).

*The mediation of the effect of reward sensitivity on dependency by passion:* Passion significantly mediated the effect of the personality facet sensitivity to reward on exercise addiction in dance. This effect was found for each of the passion measures (the general passion score of the com.pass scale, the passion criteria score of the dual model passion scale, and the subscales harmonious and obsessive passion of the dual model passion scale;  $.098 \leq \beta \leq .387$ ). The com.pass passion score even fully mediated this relationship so that, with passion as mediator, there was no direct effect of the BAS on dependency. The results are summarized in Table 37 (see appendix).

Table 29

Normal and robust Correlations for sample 1 (amateur dancers;  $N = 149$ )

		Pearson Correlations, winsorized Pearson correlations and confidence intervals for robust Pearson correlations									
		2	3	4	5	6	7	8	9	10	11
1. Intent	$r$ ( $r_{wins}$ )	.52*(.51*)	.62*(.52*)	.62*(.56*)	.72 <sup>a</sup> *(.64 <sup>a</sup> *)	.57*(.57*)	.49*(.38*)	.60*(.53*)	.53*(.46*)	.02(.02)	.56*(.54*)
(com.pass)	$C.I.$ ( $r_{robust}$ )	.39-.66*	.50-.75*	.48-.76*	.61-.82 <sup>a</sup> *	.45-.68*	.35-.63*	.47-.74*	.39-.66*	-.16-.20	.38-.75*
2. Identification	$r$ ( $r_{wins}$ )		.58*(.52*)	.47*(.52*)	.61 <sup>a</sup> *(.60 <sup>a</sup> *)	.54*(.67*)	.38*(.37*)	.60*(.54*)	.50*(.48*)	.07(.07)	.63*(.61*)
(com.pass)	$C.I.$ ( $r_{robust}$ )		.40-.75*	.32-.62*	.46-.76 <sup>a</sup> *	.38-.70*	.20-.58*	.44-.75*	.35-.65*	-.12-.25	.48-.78
3. Long-term goals (com.pass)	$r$ ( $r_{wins}$ )			.51*(.47*)	.67 <sup>a</sup> *(.57 <sup>a</sup> *)	.51*(.53*)	.51*(.52*)	.64*(.56*)	.50*(.43*)	.05(.07)	.53*(.42*)
	$C.I.$ ( $r_{robust}$ )			.37-.65*	.55-.79 <sup>a</sup> *	.37-.64*	.37-.65*	.52-.77*	.34-.65*	-.12-.22	.37-.69*
4. Desire (com.pass)	$r$ ( $r_{wins}$ )				.62 <sup>a</sup> *(.62 <sup>a</sup> *)	.41*(.51*)	.46*(.39*)	.53*(.52*)	.48*(.44*)	-.06(-.06)	.54*(.58*)
	$C.I.$ ( $r_{robust}$ )				.45-.79 <sup>a</sup> *	.25-.58*	.30-.62*	.37-.68*	.28-.67*	-.24-.12	.34-.73*
5. Passion (com.pass)	$r$ ( $r_{wins}$ )					.59*(.68*)	.56*(.46*)	.71*(.64*)	.60*(.55*)	.00(.01)	.68*(.67*)
	$C.I.$ ( $r_{robust}$ )					.48-.70*	.43-.69*	.58-.83*	.45-.74*	-.17-.17	.52-.84*
6. Passion criteria (DM)	$r$ ( $r_{wins}$ )						.75*(.53*)	.56*(.64*)	.36*(.37*)	.06(.07)	.47*(.60*)
	$C.I.$ ( $r_{robust}$ )							.63-.88*	.31-.81*	.05-.66*	.08-.85*
7. Harmonious Passion (DM)	$r$ ( $r_{wins}$ )							.55*(.53*)	.38*(.33*)	-.06(-.00)	.39*(.40*)
	$C.I.$ ( $r_{robust}$ )							.37-.73*	.14-.63*	-.28-.17	.13-.64*
8. Obsessive Passion (DM)	$r$ ( $r_{wins}$ )								.46*(.39*)	.10(.08)	.63*(.54*)
	$C.I.$ ( $r_{robust}$ )								.30-.62*	-.07-.27	.50-.76*
9. BAS	$r$ ( $r_{wins}$ )						.21*	.32*		.08(.13)	.44*(.39*)
	$C.I.$ ( $r_{robust}$ )						-	-		-.10-.26	.28-.60*
10. BIS	$r$ ( $r_{wins}$ )						-.13	.14			.07(.09)
	$C.I.$ ( $r_{robust}$ )						-	-			-.14-.28
11. Exercise Addiction	$r$						.13	.55*			

Note. <sup>a</sup> = part-whole corrected;  $r$  = normal Pearson correlation;  $r_{(wins)}$  = in order to avoid outlier-biased interpretations, the 10% most extreme values at each end of the distribution were 'winsorized' (=replaced by the closest non-outlying value). Winsorized correlations were computed with the statistical program R (function `wincor`; package: `WRS`, option `tr=.2`, see Wilcox, 2012a).  $C.I.$  ( $r_{robust}$ ) = Confidence Intervals for robust Pearson correlations were computed with the statistical program R (function: `pcorhc4`; package: `WRS`). The so computed correlations are robust to heteroskedasticity and non-normal distribution, even in small samples (Wilcox, 2012b). \* = significant ( $p \leq .05$ ; one-tailed); Com.pass = com.pass model of passion; DM = Dual Model of Passion; Above the diagonal the Pearson correlations are reported; numbers below the diagonal correspond to partial correlations between in which the other type of passion is controlled as covariate. The polarity of the BIS/BAS scales was reversed according to the polarity of the other scales, so that low scores reflected low degrees in BIS / BAS.

## Study 2

In order to replicate the findings of the studies one across different sport contexts, a second study was conducted with adult amateur martial arts practitioners.

### *Participants and procedure*

N = 95 leisure martial arts practitioners were surveyed with paper and pencil questionnaires in their gyms. 36.6 % were female, the mean age was: 33.67 (SD = 14.36). On average, the participants had practiced martial arts for 9.33 years.

### *Measures*

In this study we applied the same measures as in the first study (see above), namely two passion scales (Moeller & Grassinger, in prep.; Vallerand et al., 2003), the BIS / BAS scale (Strobel et al., 2001), and the Exercise Addiction Inventory for the assessment of dependency for the sport activity (Terry et al., 2004).

### *Results and discussion*

*Passion and reward responsiveness.* As in study one, all measures of passion were positively correlated with the overall BAS score.

*Passion and dependency.* Exercise addiction was correlated positively with all measures of passion. As hypothesized, this correlation was strong for obsessive passion, and moderate for the other passion scores. There was no significant relation between the sensitivity to reward and dependency, which is unexpected because we found this link in study one and correlations between the BAS and non-substance related dependency were found in other domains such as eating disorders (Davis et al., 2008).

Table 30

Normal and robust Correlations for sample 2 (amateur martial arts practitioners;  $N = 95$ )

		Pearson Correlations, winsorized Pearson correlations and confidence intervals for robust Pearson correlations									
		2	3	4	5	6	7	8	9	10	11
1. Intent	$r$ ( $r_{wins}$ )	.28*(.28*)	.51*(.55*)	.35*(.33*)	.45* <sup>a</sup> (.46* <sup>a</sup> )	.51*(.51*)	.46*(.45*)	.53*(.51*)	.12(.11)	-.16(-.08)	.52*(.42*)
(com.pass)	$C.I.$ ( $r_{robust}$ )	-.00-.55	.27-.74*	.12-.58*	.19-.70* <sup>a</sup>	.26-.75*	.22-.70*	.33-.73*	-.10-.33	-.39-.07	.32-.72*
2. Identification	$r$ ( $r_{wins}$ )		.64*(.57*)	.48*(.44*)	.59* <sup>a</sup> (.51* <sup>a</sup> )	.59*(.54*)	.52*(.41*)	.31*(.27*)	.39*(.33*)	-.04(-.06)	.21*(.22*)
(com.pass)	$C.I.$ ( $r_{robust}$ )		.47-.80*	.30-.65*	.41-.76* <sup>a</sup>	.45-.73*	.37-.67*	.11-.50*	.18-.59*	-.28-.20	-.02-.44
3. Long-term goals	$r$ ( $r_{wins}$ )			.49*(.43*)	.69* <sup>a</sup> (.67*)	.69*(.70*)	.70*(.70*)	.57*(.57*)	.29*(.23*)	-.22*(-.21*)	.38*(.39*)
(com.pass)	$C.I.$ ( $r_{robust}$ )			.27-.71*	.52-.87* <sup>a</sup>	.55-.84*	.54-.87*	.36-.78*	.07-.52*	-.50-.07	.19-.57*
4. Desire	$r$ ( $r_{wins}$ )				.55* <sup>a</sup> (.46*)	.34*(.25*)	.54*(.40*)	.15(.09)	.38*(.36*)	.04(-.09)	.21*(.18*)
(com.pass)	$C.I.$ ( $r_{robust}$ )				.35-.75* <sup>a</sup>	.16-.52*	.38-.69*	-.06-.37	.17-.58*	-.20-.27	.01-.41*
5. Passion	$r$ ( $r_{wins}$ )					.62*(.58*)	.70*(.61*)	.42*(.39*)	.41*(.30*)	-.08(-.13)	.37*(.30*)
(com.pass)	$C.I.$ ( $r_{robust}$ )					.48-.76*	.58-.83*	.21-.62*	.22-.60*	-.31-.16	.18-.56*
6. Passion criteria	$r$ ( $r_{wins}$ )						.69*(.68*)	.44*(.39*)	.22*(.15*)	-.26*(-.27*)	.36*(.32*)
(DM)	$C.I.$ ( $r_{robust}$ )						.56-.82*	.23-.64*	.02-.42*	-.45--.07*	.16-.55*
7. Harmonious	$r$ ( $r_{wins}$ )							.43*(.36*)	.23*(.20)	-.16(-.21*)	.27*(.25*)
Passion (DM)	$C.I.$ ( $r_{robust}$ )							.27-.60*	.01-.46*	-.39-.07	.08-.47*
8. Obsessive	$r$ ( $r_{wins}$ )								.04(.01)	-.11(-.03)	.57*(.54*)
Passion (DM)	$C.I.$ ( $r_{robust}$ )								-.15-.24	-.31-.09	.41-.73*
9. BAS	$r$ ( $r_{wins}$ )						.24*	-.07		.02(-.07)	.15(.11)
	$C.I.$ ( $r_{robust}$ )									-.20-.25	-.06-.36
10. BIS	$r$ ( $r_{wins}$ )						-.13	-.05			-.04(-.06)
	$C.I.$ ( $r_{robust}$ )										-.25-.17
11. Exercise											
Addiction	$r$						.04	.53*			
Inventory											

Note. <sup>a</sup> = part-whole corrected;  $r$  = normal Pearson correlation;  $r_{(wins)}$  = in order to avoid outlier-biased interpretations, the 10% most extreme values at each end of the distribution were 'winsorized' (=replaced by the closest non-outlying value). Winsorized correlations were computed with the statistical program R (function `wincor`; package: WRS, option `tr=.2`, see Wilcox, 2012a).  $C.I.$  ( $r_{robust}$ ) = Confidence Intervals for robust Pearson correlations were computed with the statistical program R (function: `pcorhc4`; package: WRS). The so computed correlations are robust to heteroskedasticity and non-normal distribution, even in small samples (Wilcox, 2012b). \* = significant ( $p \leq .05$ ; one-tailed); Com.pass = com.pass model of passion; DM = Dual Model of Passion; Above the diagonal the Pearson correlations are reported; numbers below the diagonal correspond to partial correlations between in which the other type of passion is controlled as covariate. The polarity of the BIS/BAS scales was reversed according to the polarity of the other scales, so that low scores reflected low degrees in BIS / BAS..

### Study 3

The third study was conducted in order to investigate the expected link between passion and impulsive sensation seeking, and to replicate the findings of the previous studies in a new domain and with an alternative measure of non-substance related dependency.

#### *Participants and procedure*

N = 98 nonprofessional poker players filled out online-questionnaires. The online survey was accessible for 34 days in Winter 2012. The link and password for the online study were advertised in poker-specific online-forums. Additionally, administrators of German, Swizz and Austrian poker clubs were asked via e-mail to distribute these information among their members. 88.6% of the participants were male, the mean age was 30.1 years (SD = 9.78). In the last week before the survey, the participants had spent on average 592 Minutes (= 98.7 hours) with poker.

#### *Measures*

Passion and the BAS were assessed as in studies 1 and 2. The BIS scale was not assessed because we did not have specific hypotheses regarding this dimension. As aspect of dependency from poker play, we assessed the loss of control with the corresponding subscale from the German Internet Addiction Scale (Hahn & Jerusalem, 2010). This scale consists of 4 items. The response scale is dichotomous with 1 = *yes*, 2 = *no*<sup>12</sup>. The item text was adapted to poker. Impulsive Sensation Seeking was assessed with the equally named 10-item subscale from the Zuckerman-Kuhlman-Personality-Questionnaire (short form, German version: ZKPQ-50-cc; Aluja et al., 2006). The response scale is dichotomous with 1 = *true*, 2 = *not true*<sup>12</sup>.

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<sup>12</sup> For the analysis, the polarity of this scale was reversed in line with the polarity of the other scales.



*Results and discussion*

*Passion and reward responsiveness.* In contrast to our expectations, the general BAS measure was unrelated to any of the passion scores. Wondering about this result we inspected the correlation pattern for the specific facets of the BAS, expecting positive correlations with passion for the subscale reward responsiveness (RR), which is the closest BAS-measure for the reward sensitivity we are interested in. This BAS subscale indeed correlates positively with the passion criteria of the dual model of passion ( $r = .18$ ) and with the com.pass passion score ( $r = .20$ ). This link between passion and the BAS is concealed if only the overall BAS score is considered, because the other BAS subscales ('drive' and 'fun seeking') are unrelated to most passion measures. The positive correlation between the BAS-RR scale and general passion replicates findings from our previous studies (see above) and confirms our hypothesis that passion is related to reward sensitivity. The fact that only general passion but not harmonious or obsessive passion are unrelated to the BAS reward responsiveness subscale demonstrates that it can be useful for theoretical reasons to distinguish between general measures of passion and specific passion types. However, these results concerning the reward responsiveness facet of the BAS require replication with other BAS measures because of the problematic factor structure of the German BAS scale (Strobel et al., 2001) and the unsatisfying reliability of the RR subscale in this study ( $\alpha = .56$ ).

*Passion and impulsive sensation seeking.* The validity of the scale for Impulsive Sensation Seeking (ImpSS) was demonstrated by its high correlation with BAS subscale funseeking ( $r = .61$ ), which demonstrates the convergent validity of these scales. Against the expectations, no systematic correlations between passion measures and impulsive sensation seeking were found. Solely the com.pass subscale motivational intensity was significantly but negatively and weakly correlated with impulsive sensation seeking. Also unexpected is the finding that impulsive sensation seeking and loss of control are unrelated. Since the validity of the involved measures was supported by the other findings (see above the inter-correlations

of the impulsive sensation seeking scale with the BAS fun seeking scale), these findings seem to contradict the theory from Tosun and Lajunen (2009), according to which impulsive sensation seeking explains the link between passion and dependency. However, replications of this result in other domains and more heterogeneous samples are needed before these findings can be generalized.

*Passion and dependency.* The general passion score of each passion scale is medium-sized correlated with the loss of control, i.e. with a symptom of dependency. As expected, obsessive passion is highly correlated with the loss of control in poker play, whereas harmonious passion is unrelated to this symptom of non-substance related dependency, or, if obsessive passion is controlled in a partial correlation, harmonious passion even correlates negatively to the loss of control. This replicates findings from the previous studies.

As in study two, there is no relation between the BAS and the measure for dependency.

Table 31

*Normal and robust correlations for sample 3 (amateur Poker player; N = 98)*

		<i>Pearson correlations and confidence intervals for winsorized, robust Pearson correlations</i>									
		2	3	4	5	6	7	8	9	10	11
1. Intent (com.pass)	<i>r</i>	.58*	.72*	.42*	.64*	.71*	.48*	.61*	.07	-.04	.34*
	<i>C.I. (r<sub>robust</sub>)</i>	.36-.68*	.57-.83*	.02-.44*	.37-.70*	.50-.82*	.20-.58*	.47-.76*	-.14-.29	-.22-.21	-.13-.56*
2. Identification (com.pass)	<i>r</i>		.66*	.49*	.67*	.70*	.62*	.57*	.05 <sup>b</sup>	.05	.28*
	<i>C.I. (r<sub>robust</sub>)</i>		.44-.75*	.11-.50*	.37-.71*	.55-.83*	.37-.71*	.38-.70*	-.20-.23	-.31-.10	-.03-.42
3. Long-term goals (com.pass)	<i>r</i>			.44*	.69*	.76*	.57*	.66*	.08 <sup>b</sup>	.02	.40*
	<i>C.I. (r<sub>robust</sub>)</i>			.02-.43*	.47-.77*	.62-.86*	.30-.65*	.46-.75*	-.17-.26	-.32-.11	.07-.48*
4. Desire (com.pass)	<i>r</i>				.51*	.58*	.62*	.32*	-.03	-.19*	.07
	<i>C.I. (r<sub>robust</sub>)</i>				.01-.42*	.16-.56*	.27-.62*	.07-.48*	-.05-.36	-.16-.27	-.30-.17
5. Passion (com.pass)	<i>r</i>					.79*	.71*	.57*	.02 <sup>b</sup>	-.10	.24*
	<i>C.I. (r<sub>robust</sub>)</i>					.61-.83*	.40-.72*	.48-.75*	-.07-.36	-.28-.16	.02-.46*
6. Passion criteria (DM)	<i>r</i>						.63*	.51*	.00 <sup>b</sup>	-.10	.28*
	<i>C.I. (r<sub>robust</sub>)</i>						.36-.70*	.39-.73*	-.09-.33	-.22-.20	.04-.47*
7. Harmonious Passion (DM)	<i>r</i>							.41*	.05	-.06	.07
	<i>C.I. (r<sub>robust</sub>)</i>							.15-.54*	-.08-.34	-.24-.21	-.29-.17
8. Obsessive Passion (DM)	<i>r</i>								.03	.08	.64*
	<i>C.I. (r<sub>robust</sub>)</i>								-.17-.26	-.37-.08	.08-.53*
9. BAS	<i>r</i>						-.02	-.07		.40 <sup>*b</sup>	.02
	<i>C.I. (r<sub>robust</sub>)</i>									.07-.48*	-.12-.33
10. Impulsive Sensation Seeking	<i>r</i>						.09	-.09			-.03
	<i>C.I. (r<sub>robust</sub>)</i>										-.34-.10
11. Loss of Control	<i>r</i>						-.27*	.67*			

Note. <sup>a</sup> = part-whole corrected; *r* = normal Pearson correlation. *C.I. (r<sub>robust</sub>)* = Confidence interval for a robust Pearson correlation coefficient. Robust means here: outlier in the involved variables were winsorized (program: R, package: 'psych', function: 'winsor') and these winsorized variables were used to compute a correlation robust against non-normality and heteroskedasticity (program: R, package: 'WRS', function: 'pcorhc4'). <sup>b</sup> = for the BAS subscale 'reward responsiveness', these correlations are significant ( $.18 \leq r \leq .25$ ); \* = significant ( $p \leq .05$ ; one-tailed); com.pass = com.pass model of passion; DM = Dual Model of Passion; Above the diagonal the Pearson correlations are reported; numbers below the diagonal correspond to partial correlations between in which the other type of passion is controlled as covariate. The polarity of the BIS/BAS scales was reversed according to the polarity of the other scales, so that low scores reflected low degrees in BIS / BAS.

#### Study 4

In order to investigate the relation of passion to reward sensitivity and trait affectivity, study four investigated adolescent leisure soccer players.

##### *Participants and procedure*

The sample comprised of 278 adolescent soccer players in the German federal state of Thuringia. Participants were on average 14.87 years old (range from 11 to 19 years). 99.1% were male. 46 participants had responded to online questionnaires, and 234 participants filled out paper and pencil questionnaires. Two participants of the online questionnaire were excluded because they were much older ( $> 27$  years) than the target sample. Links to the online survey were sent via mass e-mail to all soccer clubs in the German Federal state Thuringia by the Thuringian Soccer Association (Thüringer Fußball-Verband, TFV). Together with that e-mail, the clubs also received flyers and posters for the announcement of the study. All trainers were asked to announce the study with the help of these materials and to motivate all youth soccer players of the age classes A (13-14 years), B (15-16 years), and C (17-18 years) for participation in the study. Because only few soccer players responded to the online questionnaire, in a second step 18 Thuringian soccer clubs were surveyed with paper and pencil questionnaires during training sessions by the authors. Only clubs with competitive youth teams were contacted.

##### *Measures*

*Passion.* As in the studies one to three, passion was measured with the com.pass scale and with the passion scale from Vallerand et al. (2003). The subscales of the com.pass scale were satisfactorily reliable ( $\alpha \geq .69$ ). The subscales of the passion scale from Vallerand et al. (2003) were reliable ( $\alpha \geq .85$ ).

*Dispositional approach motivation.* Approach motivation was assessed with the German version of Carver and White's (1994) BAS scale (Strobel et al., 2001; see studies 1-

3). Additionally, the Positive Negative Affect Schedule (PANAS; Krohne et al., 1996) was used to tap positive and negative approach motivation. Implementing a suggestion by Egloff et al. (2003), we subdivided the Positive Affect PANAS subscale into the three subscales joy, interest, and activation, and expected to tap positive approach motivation with the subscales interest and activation. For the assessment of negative-valenced approach motivation, we assessed anger with three items of the Negative Activation PANAS subscale (with German equivalents for the items ‘hostile’, ‘angry’, and ‘irritated’, see Harmon-Jones et al., 2009, p. 189 for justification of the item selection).

*Dispositional positive affectivity.* Positive affectivity was assessed with the Positive Activation subscale of the PANAS, particularly the subscale joy (see Egloff et al. (2003).

#### *Results and discussion*

*Passion and positive affectivity.* As expected, all measures of passion are positively correlated with the positive affectivity PANAS subscale ‘joy’. Importantly, if harmonious passion is controlled, obsessive passion is unrelated with joy and positive affectivity overall. This is in line with previous findings of insignificant or low correlations between OP and liking (Marsh et al., 2013; Philippe et al., 2010), but contradicts the definition of obsessive passion as an activity that a person likes (Vallerand et al., 2003).

*Passion and approach motivation.* The positive approach motivation PANAS subscales ‘interest’ and ‘activation’ are strongly positively correlated with all measures of passion. Even the negative approach motivation anger is significantly correlated with harmonious and obsessive passion, in the latter case with a medium-sized effect size. However, links between general measures of passion and anger are not significant. The expectation that the PANAS subscales interest, activation and anger all tap approach motivation, whereas the subscale joy does not, is validated by the correlation pattern.

Sensitivity to reward is strongly correlated with both measures of general passion and harmonious passion and medium-sized correlated with obsessive passion. The correlation between the BAS and obsessive passion remains significant, but decreases if harmonious passion is controlled as covariate. This replicates our previous findings of the studies one through three.

Table 32

Normal and robust correlations for sample 4 (adolescent leisure soccer players;  $N = 278$ )

		<i>Pearson correlations and confidence intervals for winsorized, robust Pearson correlations</i>													
		2	3	4	5	6	7	8	9	10	11	12	13	14	15
1. Intent (com.pass)	<i>r</i>	.68*	.81*	.62*	.79* <sup>a</sup>	.65*	.71*	.58*	.50*	.55*	.10	.49*	.55*	.50*	.10
	<i>C.I.</i>	.56–	.71–	.49–	.67–	.55–	.58–	.45–	.34–	.43–	-.07–	.36–	.41–	.36–	-.02–
	<i>(r<sub>robust</sub>)</i>	.73*	.84*	.68*	.81*	.73*	.75*	.64*	.57*	.64*	.19	.58*	.62*	.57*	.23
2. Identification (com.pass)	<i>r</i>		.77*	.62*	.77* <sup>a</sup>	.63*	.76*	.57*	.58*	.60*	.09	.56*	.56*	.55*	.12*
	<i>C.I.</i>		.68–	.49–	.67–	.58–	.67–	.46–	.47–	.51–	-.11–	.45–	.44–	.42–	-.07–
	<i>(r<sub>robust</sub>)</i>		.83*	.67*	.81*	.75*	.82*	.65*	.66*	.69*	.15	.65*	.64*	.63*	.19
3. Long-term goals (com.pass)	<i>r</i>			.62*	.81* <sup>a</sup>	.68*	.72*	.58*	.55*	.58*	.06	.56*	.56*	.50*	.06
	<i>C.I.</i>			.50–	.73–	.63–	.61–	.48–	.42–	.49–	-.12–	.43–	.45–	.41–	-.09–
	<i>(r<sub>robust</sub>)</i>			.68*	.86*	.78*	.77*	.66*	.62*	.68*	.14	.63*	.65*	.61*	.17
4. Desire (com.pass)	<i>r</i>				.68* <sup>a</sup>	.52*	.63*	.33*	.49*	.57*	-.01	.51*	.52*	.52*	.03
	<i>C.I.</i>				.55–	.38–	.49–	.17–	.34–	.44–	-.13–	.35–	.39–	.41–	-.08–
	<i>(r<sub>robust</sub>)</i>				.71*	.58*	.68*	.40*	.56*	.65*	.12	.57*	.60*	.62*	.18
5. Passion (com.pass)	<i>r</i>					.68*	.79*	.54*	.60*	.66*	.05	.60*	.62*	.59*	.07
	<i>C.I.</i>					.59–	.69–	.39–	.46–	.57–	-.12–	.48–	.50–	.49–	-.06–
	<i>(r<sub>robust</sub>)</i>					.75*	.83*	.59*	.66*	.74*	.14	.68*	.69*	.68*	.19
6. Passion criteria (DM)	<i>r</i>						.71*	.55*	.60*	.65*	.05	.59*	.65*	.57*	.04
	<i>C.I.</i>						.64–	.49–	.50–	.51–	-.11–	.44–	.49–	.43–	-.09–
	<i>(r<sub>robust</sub>)</i>						.79*	.68*	.69*	.70*	.15	.64*	.69*	.64*	.17
7. Harmonious Passion (DM)	<i>r</i>							.70*	.64*	.67*	.18*	.61*	.66*	.61*	.15*
	<i>C.I.</i>							.60–	.49–	.59–	.01–	.50–	.53–	.50–	.00–
	<i>(r<sub>robust</sub>)</i>							.75*	.68*	.75*	.27*	.69*	.71*	.69*	.26*
8. Obsessive Passion (DM)	<i>r</i>								.52*	.50*	.34*	.49*	.45*	.45*	.29*
	<i>C.I.</i>								.39–	.41–	.15–	.39–	.34–	.34–	.13–
	<i>(r<sub>robust</sub>)</i>								.60*	.61*	.40*	.60*	.56*	.56*	.37*
9. BAS	<i>r</i>						.45*	.12*		.65*	.05	.56*	.63*	.62*	.09
	<i>C.I.</i>									.51–	-.15–	.39–	.48–	.46–	-.09–
	<i>(r<sub>robust</sub>)</i>									.70*	.12	.62*	.68*	.66*	.18

Table 33 (continued)

Normal and robust correlations for sample 4 (adolescent leisure soccer players;  $N = 278$ )

		Pearson correlations and confidence intervals for winsorized, robust Pearson correlations													
		2	3	4	5	6	7	8	9	10	11	12	13	14	15
10. Positive affect (PANAS)	<i>r</i>						.53*	.06			.14*	.77* <sup>a</sup>	.86* <sup>a</sup>	.82* <sup>a</sup>	.14*
	<i>C.I.</i>										-.08-	.65-	.77-	.70-	-.02-
	<i>(r<sub>robust</sub>)</i>										.18	.80	.89*	.83*	.23
11. Negative affect (PANAS)	<i>r</i>						-.09	.30*				.09	.15*	.15*	.70* <sup>a</sup>
	<i>C.I.</i>											-.10-	-.05-	-.08-	.52-
	<i>(r<sub>robust</sub>)</i>											.16	.20	.18	.71*
12. Joy (PANAS)	<i>r</i>						.43*	.10					.76*	.71*	.09
	<i>C.I.</i>												.66-	.56-	-.08-
	<i>(r<sub>robust</sub>)</i>												.82*	.74*	.19
13. Interest (PANAS)	<i>r</i>						.54*	-.00						.83*	.15*
	<i>C.I.</i>													.70-	.00-
	<i>(r<sub>robust</sub>)</i>													.84*	.27*
14. Activation (PANAS)	<i>r</i>						.46*	.05							.13*
	<i>C.I.</i>														-.02-
	<i>(r<sub>robust</sub>)</i>														.24*
15. Anger (PANAS)	<i>r</i>						-.09	.27*							

Note. <sup>a</sup> = part-whole corrected; *r* = normal Pearson correlation. *C.I. (r<sub>robust</sub>)* = Confidence interval for a robust Pearson correlation coefficient. Robust means here: outlier in the involved variables were winsorized (program: R, package: 'psych', function: 'winsor') and these winsorized variables were used to compute a correlation robust against non-normality and heteroskedasticity (program: R, package: 'WRS', function: 'pcorhc4'); com.pass = com.pass model of passion; DM = Dual Model of Passion; PANAS = Positive Affect Negative Affect Schedule; BAS = Behavioral Approach System; Above the diagonal the Pearson correlations are reported; numbers below the diagonal correspond to partial correlations between in which the other type of passion is controlled as covariate..



## Study 5

### *Purpose*

The last study was conducted in order to substantiate previous findings with alternative affectivity scales.

### *Participants and procedure*

N = 206 undergraduate students of the University of Erfurt (Germany) filled out paper and pencil questionnaires in class. Participants were instructed to name their three favorite activities, to rank these activities according to their importance for themselves and to answer to all following questions in regard to the first ranked activity. The average age was 24.24 years ( $SD = 3.32$ ). 78.6 % were females. 48 participants (24.2 %) studied in the major subject psychology, 77 students (38.9 %) studied to become teachers, 39 participants (19.7 %) studied another pedagogical major, and 28 participants studied other majors.

### *Measures*

*Passion.* As in the previous studies, passion was measured with the dual model passion scale (Vallerand et al., 2003) and the com.pass scale (Moeller & Grassinger, in prep.). All but one measures of passion were satisfyingly reliable, only the internal consistency of the four core passion criteria from Vallerand et al. (2003) was not ( $\alpha = .59$ ). Particularly the item ‘spend time and energy with this activity’ decreased the internal consistency, which is in line with previous findings (Moeller & Grassinger, in prep.).

*Affect.* Dispositional affect was measured with the affect scale from (Kessler & Staudinger, 2009). This scale is an adaptation of the PANAS with the advantage that it allows for the systematical differentiation between valence and intensity of affect. This affect scale consists of four subscales each of which comprises four items: 1) high arousal positive affect, 2) low arousal positive affect, 3) high arousal negative affect, and 4) low arousal negative

affect. The reliability of the subscales high and low arousal positive affect and low arousal negative affect were satisfying ( $\alpha \geq .75$ ), but the internal consistency of the high arousal negative subscale was not (.54).

*Trait cheerfulness.* Trait cheerfulness was measured with the German version of the State-Trait-Cheerfulness-Inventory (STHI-60-T, 60-item trait version, Ruch et al., 1996; 1997). This inventory consists of three 20-items subscales measuring cheerfulness, seriousness, and bad mood. The internal consistencies of all subscales was satisfying ( $\alpha \geq .83$ ).

#### *Results and discussion*

*Passion and motivational intensity (as proxy for approach motivation).* Only positive high arousal affectivity is systematically related to measures of passion. Negative high arousal affectivity is unrelated to all measures of passion.

*Passion and positive trait affectivity:* Measures of general passion are positively correlated with high arousal positive affectivity. Low arousal positive affectivity, in contrast, is not related to the general passion criteria from Vallerand et al. (2003) and negatively related to the com.pass passion score, because of its expectable negative correlation with the com.pass subscale motivational intensity. Low arousal negative affectivity is negatively correlated with general passion and harmonious passion.

As expected, general passion and harmonious passion are positively correlated with trait cheerfulness, the effect sizes are small. Of the com.pass scale components, identification and motivational intensity were positively correlated with trait cheerfulness. The com.pass passion score and harmonious passion are negatively related to trait bad mood, whereas obsessive passion correlates positively with bad mood. All effect sizes for correlations between passion and aspects of cheerfulness were small.

Table 34

Normal and robust correlations for sample 5 (German undergraduate students;  $N = 206$ )

		Pearson correlations and confidence intervals for winsorized, robust Pearson correlations													
		2	3	4	5	6	7	8	9	10	11	12	13	14	15
1. Intent (com.pass)	<i>r</i>	.51*	.54*	.40*	.58* <sup>a</sup>	.48*	.46*	.45*	-.06	.18*	-.24*	-.08	.18*	-.02	-.15*
	<i>C.I. (r<sub>robust</sub>)</i>	.30–	.38–	.14–	.32–	.34–	.26–	.21–	-.08–	.06–	-.27–	-.20–	.01–	-.15–	-.25–
2. Identification (com.pass)	<i>r</i>	.53*	.63*	.49*	.67* <sup>a</sup>	.57*	.49*	.40*	-.13	.16*	-.20*	-.04	.23*	-.04	-.18*
	<i>C.I. (r<sub>robust</sub>)</i>		.42–	.31–	.52–	.42–	.33–	.16–	-.24–	.05–	-.29–	-.21–	.10–	-.18–	-.33–
3. Long-term goals (com.pass)	<i>r</i>		.65*	.55*	.72* <sup>a</sup>	.64*	.57*	.42*	.04	.32*	-.02	.07	.37*	.10	-.06*
	<i>C.I. (r<sub>robust</sub>)</i>			.15	.39–	.43–	.48–	.40–	-.16–	-.04–	-.24–	-.14–	-.06–	-.16–	-.20–
4. Desire (com.pass)	<i>r</i>				.52* <sup>a</sup>	.44*	.39*	.18*	-.19*	.30*	-.40*	.02	.24*	-.04	-.19*
	<i>C.I. (r<sub>robust</sub>)</i>				.27–	.32–	.20–	-.07–	-.22–	.22–	-.49–	-.12–	.07–	-.16–	-.31–
5. passion (com.pass)	<i>r</i>				.51*	.55*	.44*	.22	.05	.48*	-.22*	.15	.34*	.12	-.04*
	<i>C.I. (r<sub>robust</sub>)</i>				.72*	.64*	.42*	.07	.44*	-.16*	.10	.36*	.11	-.07*	
6. Passion criteria (DM)	<i>r</i>					.63*	.53*	.48*	-.05	.18*	-.28*	-.13	.24*	-.01	-.15*
	<i>C.I. (r<sub>robust</sub>)</i>					.41–	.29–	-.15–	.08–	-.38–	-.25–	.08–	-.22–	-.21–	
7. Harmonious passion (DM)	<i>r</i>						.57*	.02	.24*	-.22*	-.06	.16*	.03	.06	.07
	<i>C.I. (r<sub>robust</sub>)</i>						.46–	-.05–	.22–	-.25–	-.09–	.05–	-.15–	-.21–	
8. Obsessive passion (DM)	<i>r</i>						.67*	.23	.47*	.02	.20	.31*	.12	.06	
	<i>C.I. (r<sub>robust</sub>)</i>							-.11	.09	-.07	.06	.10	-.15*	.08	
9. Low Arousal positive affect	<i>r</i>								.10	.24	.14	.25	.20	-.04*	.24
	<i>C.I. (r<sub>robust</sub>)</i>							.09	-.14*		.19*	.10	-.19*	.03	.04
										-.03–	-.09–	-.31–	-.05–	-.10–	-.16–
										.24	.18	-.04*	.23	.19	.12

Table 34 (continued)

*Normal and robust correlations for sample 4 (adolescent leisure soccer players; N = 278)*

		<i>Pearson correlations and confidence intervals for winsorized, robust Pearson correlations</i>													
		2	3	4	5	6	7	8	9	10	11	12	13	14	15
10. High Arousal positive affect	<i>r</i>						.24*	-.07			-.20*	.06	.35*	-.17	-.22*
	<i>C.I. (r<sub>robust</sub>)</i>										-.40– -.14*	-.11– .18	.30– .54*	-.34– -.07*	-.38– -.11*
11. Low Arousal negative affect	<i>r</i>						-.23*	.07			.36*	-.19*	.02	.23*	
	<i>C.I. (r<sub>robust</sub>)</i>										.14– .39*	-.29– -.02*	-.10– .18	.03– .30*	
12. High Arousal negative affect	<i>r</i>						-.13*	.12				-.13	-.02	.24*	
	<i>C.I. (r<sub>robust</sub>)</i>											-.25– .03	-.19– .08	.09– .36*	
13. Cheerfulness	<i>r</i>						.16*	-.03						-.32*	-.65*
	<i>C.I. (r<sub>robust</sub>)</i>													-.46– -.20*	-.68– -.47*
14. Seriousness	<i>r</i>						.12	-.19*							.21*
	<i>C.I. (r<sub>robust</sub>)</i>														.11– .37*
15. Bad mood	<i>r</i>						-.19*	.15*							

Note. <sup>a</sup> = part-whole corrected; *r* = normal Pearson correlation. *C.I. (r<sub>robust</sub>)* = Confidence interval for a robust Pearson correlation coefficient. Robust means here: outlier in the involved variables were winsorized (program: R, package: 'psych', function: 'winsor') and these winsorized variables were used to compute a correlation robust against non-normality and heteroskedastity (program: R, package: 'WRS', function: 'pcorhc4'); com.pass = com.pass model of passion; DM = Dual Model of Passion; Above the diagonal the Pearson correlations are reported; numbers below the diagonal correspond to partial correlations between in which the other type of passion is controlled as covariate.

### Multilevel Analysis to Disentangle person-specific and activity specific sources of variance

#### *Purpose*

In order to find out to what extent personality characteristics and characteristics of the respective activity influence the individual passion score, we decomposed these two sources of variance in a multilevel analysis.

#### *Participants and procedure*

For this purpose it was necessary to merge datasets of several studies, so that a larger dataset with a variety of activity contexts resulted. All studies with activity-specific samples (the studies 1 to four) were merged together into the 'Dataset A' (N = 622).

#### *Measures and analysis*

Multilevel analyses were conducted in the program Mplus, version 6 (Muthén & Muthén, 2008-2011). The cluster variable differentiated between activity domains. There were four different activity domains in dataset A, so that the cluster variable was coded 1 = *dance*, 2 = *martial arts*, 3 = *poker*, and 4 = *soccer*.

The scores for passion, the BAS and trait affectivity were entered as manifest variables because the sample sizes were not big enough for latent structure equation analyses. For the decomposition of person-specific and activity-specific sources of variance, intra-class correlations (ICCs<sup>13</sup>) were computed. The ICC of a variable (here: passion) indicates the

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<sup>13</sup> The intraclass correlation is a form of variance decomposition, defined as the relation of the variance between the clusters to the total variance. In detail, the ICC is computed as the quotient of the between-level variance and the sum of between and within-level variance. Its number can be interpreted as the percentage of variance that is due to differences between the clusters. For example, an ICC of .40 for a variable tapping math competence in a model in which individuals (within-level) are nested in schools (=clusters; between-level) would mean that 40% of the variance in math competence is explained by differences between schools, and 60% are due to differences between individuals. ICCs are a well-established measure for the variance on different levels of nested data .

percentage of variance that is due to differences between clusters (in this case: between activity contexts). The difference 1-ICC indicates the percentage of the variance that is due to inter-individual differences.

### *Results and discussion*

Differences between the activity contexts determined the degree of experienced passion remarkably, as indicated by the substantial ICCs. Roughly 43% to 55% of the variance in passion is explained by differences between the four clusters dance, martial arts, poker and soccer play. The remaining variance in the passion measures (57% to 45%) is explained by inter-individual differences. The results are summarized in Table 35.

Table 35

#### *Intra-class correlations in the merged dataset A*

	$M_{(between)}$	ICC
1. Passion (com.pass)	3.97	.554
2. Passion (DM)	5.35	.426
3. HP	4.66	.487
4. OP	2.90	.507
5. BAS	2.53	.820

Note. DM = Dual model of passion (Vallerand et al., 2003); The dataset A comprised the samples of study 1, 2, 3 and 4 (dance: N = 149, martial arts: N = 95, poker player: N = 98 and soccer player: N = 278).

The finding that inter-individual differences accounted for a substantial proportion of the observed variance in passion for specific domains is one more reason to study more in detail the person-specific determinants of passion. It should be noted, however, that the ICC in these analyses are no unbiased measure for differences between activity contexts but rather display differences between the different samples, and also the samples differ in more characteristics than just the specific activity context, e.g. in gender and age of the participants. Most probably, the differences between the samples are confounded with person-specific

differences, because individuals engage in activities that match their personal characteristics (Denissen, Zarrett, & Eccles, 2007; Jacobs, Vernon, & Eccles, 2005; Rhodes & Smith, 2006). Moreover, the merged data set is no representative sample of everyday activities, because all activities have in common that our subjects chose them as hobbies and engage in them voluntarily, and because only four different activity domains could be analyzed. Thus, our results require replication in less preselected samples or randomized experiments.

#### Cluster Analysis: Grouping based on overall passion degree vs. on passion type

##### *Purpose*

Most previous studies have focused on differences between harmonious and obsessive passionate individuals, while disregarding differences between generally passionate and non-passionate individuals. This article, in contrast, has emphasized the latter issue. In order to determine whether the type of passion (harmonious vs. obsessive) or the degree of experienced passion (high vs. low passion scores) best differentiates between homogenous groups, we conducted cluster analyses for each of the aggregated datasets (A and B, see above). We expected the degree of experienced passion to account for group membership for several reasons: First, in prior person-oriented approaches, the resulting clusters were characterized by equal values in both types of passion (Wang et al., 2008: cluster 1: high HP&OP, cluster 2: average HP&OP, cluster 3: low HP&OP). The second argument for our expectation is the similarity and medium-sized to strong correlation between harmonious and obsessive passion (Vallerand et al., 2003; Wang et al., 2008). Both obsessively and harmoniously passionate individuals are intensively engaged in an activity that they like, want, value, spent resources and identify with. For these reasons, we primarily expected to find cluster differences in terms of the general degree of passion (high versus low). We secondly expected these clusters to differ in the personality traits which were related to the

general passion measures in the studies of this article, namely the trait affectivity and dispositional approach motivation (BAS).

#### *Participants and procedure*

For the purpose of cluster analyses, the data of several studies were merged together on the basis of the measures they shared: As for the multilevel analysis (see above) the studies one to four were merged into Dataset A (N = 622) because all of them had included measures for dispositional approach motivation (BAS). Secondly, the studies 4 and 5 were merged into Dataset B (N = 484) because they included measures of trait affectivity. It should be noted that the merged datasets were not independent because study four was included in both of them.

#### *Measures and analysis*

Before merging the datasets of study 4 and 5 into dataset B, the affect scales had to be aligned to a comparable metric. For this purpose, all positive affect items of the Kessler & Staudinger (2009) scale in study five were summarized as positive affect subscale (PA), disregarding the intensity they tapped. A negative affect subscale was computed likewise. Then, the PA and NA scales in both subsamples (study four and five) were standardized in order to align the different response scales.

A two-step cluster analysis was computed with the program SPSS, version 19. This cluster analysis comprised the following manifest variables: the com.pass passion score, the passion criteria score for the dual model, harmonious and obsessive passion, and in dataset A the BAS score, in dataset B the scores for positive and negative trait affectivity.

#### *Results and discussion*

In both datasets, the cluster analysis revealed two homogenous groups, one with high values in all passion measures and the other with relatively low passion values. The 'high passion' cluster in dataset A also displayed higher BAS values than the 'low-passion' cluster.



In dataset B, the ‘high passion’ cluster also displayed significantly higher scores for positive affectivity, but there were no cluster differences for negative trait affectivity. All other differences were significant and the effect sizes were large ( $d \geq 1.39$ ).

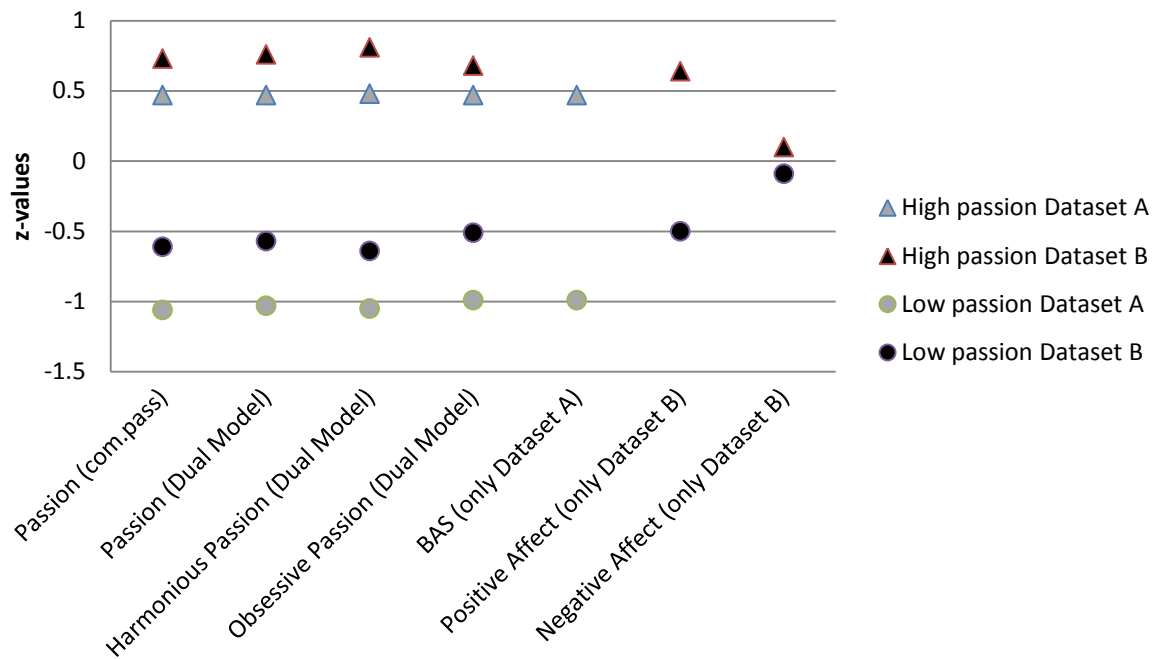


Figure 6: Cluster differences in the standardized scores for different passion measures, BAS, and affect

The results show that the differentiation between individuals with high and those with low passion scores is relevant, whereas there is no empirical base foundation for grouping on the base of passion types (harmonious vs. obsessive). This is an important guidepost for future research, given the large number of studies on differences between harmonious and obsessive individuals (e.g. Vallerand et al., 2003; Ratelle et al., 2004) and the small number of studies on differences between passionate vs. non-passionate individuals (Wang & Yang, 2007; Philippe, Vallerand, & Lavigne, 2009). Our results are in line with our expectations and with previous findings: High vs. low passion cluster and the finding that these clusters differ in positive but not in negative affect were also reported by Wang et al., (2008). It should be noted

that our datasets A and B partially overlap because both include study four (the soccer sample). Thus, the second cluster analysis cannot be interpreted as independent replication.

Table 36

*Cluster differences in Passion, BAS, and Affect*

	Cluster 1 (“high passion”)				Cluster 2 (“low passion”)				t-Test for cluster differences			
	Dataset A		Dataset B		Dataset A		Dataset B		Dataset A		Dataset B	
	(N = 367)		(N = 184)		(N = 176)		(N = 254)		(N = 176)		(N = 254)	
	$M_{(z)}$	$SD_{(z)}$	$M_{(z)}$	$SD_{(z)}$	$M_{(z)}$	$SD_{(z)}$	$M_{(z)}$	$SD_{(z)}$	$p$	$d$	$p$	$d$
1. Passion (com.pass)	.47	.648	.73	.610	-1.06	.815	-.61	.857	.000	2.16	.000	1.76
2. Passion (DM)	.47	.527	.76	.456	-1.03	.986	-.57	.891	.000	2.11	.000	1.80
3. HP (DM)	.48	.622	.81	.543	-1.05	.835	-.64	.813	.000	2.19	.000	2.03
4. OP (DM)	.47	.818	.68	.837	-.99	.601	-.51	.782	.000	1.93	.000	1.48
5. BAS	.47	.620	-	-	-.99	.924	-	-	.000	2.00	-	-
6. Positive affect	-	-	.64	.674	-	-	-.50	.910	-	-	.000	1.39
7. Negative affect	-	-	.10	1.124	-	-	-.09	.893	-	-	.058	0.19

Note.  $(z)$  = For the sake of comparability, the means and standard deviations concern the standardized scores of all involved variables. DM = Dual model of passion (Vallerand et al., 2003); The dataset A comprised the samples of study 1, 2, 3 and 4 (dance: N = 149, martial arts: N = 95, poker player: N = 98 and soccer player: N = 278) and Dataset B comprised the samples from study 4 (soccer player: N = 278) and study 5 (undergraduate students: N = 206).

### General Discussion

This article investigated relations between passion for activities, affect- and reward-related personality facets, and symptoms of dependency. Two different concepts of passion were considered, namely the dual model (Vallerand et al., 2003) and the com.pass model (Moeller & Grassinger, 2013). The results were replicated across different activity contexts.

Core criteria of passion were positively related to dispositional approach motivation (sensitivity to reward and the PANAS subscale activation), to dispositional positive and high arousal affectivity, including trait cheerfulness, and to symptoms of non-substance related dependency.

Passion of any measure mediated the link between reward sensitivity and dependency in study one, but unexpectedly, in two other studies there was no link between reward sensitivity and dependency, although passion was correlated with both reward sensitivity and dependency across all activity contexts in our studies. This contradicts our expectations, which were based on previous findings of links between sensitivity to reward and different aspects of dependency (Davis et al., 2007; Kreek et al., 2005). However, our findings are in line with several studies that found insignificant correlations between reward sensitivity and aspects of non-substance related dependency (Meerkerk, van den Eijnden, Franken, Garretsen, 2010; Meule, Vögele, & Kübler, 2012; Yen, Ko, Yen, Chen, & Chen, 2009). So, the relation between reward sensitivity and behavioral dependency remains unclear, but in all our studies there are significant positive correlations between passion and sensitivity as well as between passion and dependency.

Our findings further show that person-specific determinants account for a large proportion of variance in passion measures, even though the activity context matters as well, which is a reason to continue the research on person-specific influences. This future research

should address specific facets and discuss more specific theories about the mechanisms through which particular traits are supposed to determine the experience of passion.

Furthermore, we showed in a person-oriented approach that individuals differ in their general degree of passion, they can be distinguished into the high and the low passion cluster. Individuals with high passion scores experience both high harmonious and high obsessive passion, whereas those in the low passion cluster have low values in both types of passion. This indicates that both types of passion (HP and OP) are two sides of the same coin rather than criteria for the distinction between individuals. Passion is characterized by two different aspects, controllable and hedonic experiences (i.e. harmonious aspects), and uncontrollable, urging and even aversive experiences (i.e. obsessive aspects). Although one side might overbalance the other, they both characterize passion simultaneously. Our results indicate that harmonious aspects of passion correspond more to the liking and positive incentive motivation, e.g. joy, interest and activation (see study four), whereas obsessive passion corresponds more to aversive approach motivation, e.g. anger (see study four). We suggest to investigate in future studies the probably different mechanisms underlying these differences, but to keep in mind that both 'types' have more in common than the hitherto existing literature might suggest. Differences between individuals with low vs. high passion should receive more attention in future research.

In sum, our results show that individuals differ in the degree to which they experience passion of any type, and that these inter-individual differences are partially determined by reward- and affect-related personality facets. Individuals who generally experience strong approach motivation and hedonism in regard to reward-related stimuli are more likely to score high in passion for an activity. Person-specific characteristics account for much of the variance in passion, but activity-specific characteristics also determine the degree of experienced passion substantially. Future studies should disentangle more systematically the predictors of passion on both sides of this person-activity relationship. The knowledge about

optimal matches between person and activity characteristics could help fostering passion, as discussed by Fredricks et al. (2010).

We have shown that all passion measures correspond to strong approach motivation ('wanting'), but that only general passion and harmonious passion correspond to hedonic experiences ('liking'). This supports Moeller and Grassinger's (2013) suggestion to conceptualize wanting as essential component of passion, but to consider liking as a correlate rather than essential component of passion.

It seems that biological personality theories, which were referred to in this article, might shed some light on the predictors of passion. Our findings point to the possibility that mesolimbic dopamine might play a role in inter-individual differences regarding the experience of a passion, because the personality facets addressed in this article have all been discussed to be functions of dopamine (for sensitivity to reward, see Depue & Collins, 1999; for cheerfulness, see Mobbs, Greicuis, Abdel-Azim, Menon, & Reiss, 2003; Mobbs, Hagan, Azim, Menon, & Reiss 2004; for positive high arousal affectivity, see Depue, Luciana, Arbisi, Collins, Leon, 1994; for dependency, see Robinson & Berridge, 2008; for impulsive sensation seeking see Zuckerman, 1999). However, due to controversies about the exact role of dopamine in the experience of liking (Berridge, 2007), long-term commitment, and incentive motivation (see Depue & Collins, 1999), the passion-dopamine assumption is very vague, and should be tested more directly with methods that tap dopaminergic activity better than the here applied self-report questionnaires.

The generalizability of our results is limited by the following shortcomings: All studies in this article were cross-sectional and relied on self-report questionnaires. Longitudinal studies are needed in order to reveal causes for the reported correlations, and more objective measures should be applied in order to rule out response style biases. Moreover, all studies included in this article investigated manifest passion for particular domains, which is only one of several possible levels of abstraction. Individuals might differ

in their degree of passion for their most favorite activity, but also in the number of activities they experience high passion for, and in the degree of number of everyday life situations in which they feel committed and intensively motivated (see Moeller, Dietrich, et al., in prep.). A systematical distinction between these levels of abstraction might reveal more insights on person-specific determinants of passion.

## Appendix

Table 37

*Testing the mediation effect of passion in BAS-dependency relationships*

	Model 1				Model 2				Model 3				Model 4			
	<u>Passion (com.pass)</u>				<u>Passion (DM)</u>				<u>Harmonious Pass. (DM)</u>				<u>Obsessive Pass.(DM)</u>			
	<i>B</i>	<i>SE B</i>	$\beta$	<i>t</i>	<i>B</i>	<i>SE B</i>	$\beta$	<i>t</i>	<i>B</i>	<i>SE B</i>	$\beta$	<i>t</i>	<i>B</i>	<i>SE B</i>	$\beta$	<i>t</i>
<i>Step 1</i>																
Direct effect: Dependency on BAS	.924	.175	.441*	5.289	see model 1				see model 1				see model 1			
<i>Step 2</i>																
Direct effect: Passion on BAS	1.172	.142	.599*	8.252	1.067	.252	.358*	4.235	.835	.184	.381*	4.534	1.739	.304	.460*	5.717
<i>Mediation analysis</i>																
Direct effect: Dependency on passion	.629	.091	.646*	7.644	.253	.058	.359*	4.372	.246	.182	.246*	2.961	.308	.044	.550*	6.961
Indirect effect: Dependency on BAS	.811	.145	.387*	5.608	.270	.089	.128*	3.042	.205	.083	.098*	2.481	.536	.121	.253*	4.418
Direct effect: Dependency on BAS	.122	.177	.058	.690	.672	.089	.320*	3.042	.724	.182	.345*	3.984	.425	.163	.201*	2.604
R <sup>2</sup> passion measure	.358				.128				.145				.211			
R <sup>2</sup> dependency	.466				.313				.253				.445			

Note. \* = significant ( $p \leq .05$ ; one-tailed, only reported for the standardized  $\beta$ ); com.pass = com.pass model of passion (Moeller & Grassinger, in prep.); DM = Dual Model of Passion (Vallerand et al., 2003).



Table 38

*Descriptives and Internal Consistencies, for all samples*

	<i>Mean (SD)</i>					<i>α</i>				
	<i>Study</i>	<i>Study</i>	<i>Study</i>	<i>Study</i>	<i>Study</i>	<i>Study</i>	<i>Study</i>	<i>Study</i>	<i>Study</i>	<i>Study</i>
	<i>1</i>	<i>2</i>	<i>3</i>	<i>4</i>	<i>5</i>	<i>1</i>	<i>2</i>	<i>3</i>	<i>4</i>	<i>5</i>
Intent (com.pass)	4.34 (.803)	4.32 (.812)	2.71 (.977)	4.65 (.829)	4.45 (.754)	.82	.83	.85	.79	.74
Identification (com.pass)	4.38 (1.118)	3.69 (1.018)	2.56 (1.065)	4.55 (.900)	4.04 (1.095)	.89	.80	.88	.85	.87
Long-term goals (com.pass)	4.07 (1.061)	4.25 (.920)	2.48 (1.036)	4.61 (.964)	4.32 (1.002)	.88	.82	.88	.87	.87
Motivational intensity (com.pass)	4.85 (.758)	4.69 (.706)	4.00 (.997)	5.01 (.715)	4.66 (.836)	.79	.62	.72	.69	.69
Passion (com.pass)	4.56 (.738)	4.39 (.637)	3.29 (.825)	4.81 (.703)	4.46 (.715)	.80	.71	.68	.80	.68
Passion criteria (DM)	6.00 (1.207)	5.97 (.693)	4.45 (1.384)	6.13 (.876)	5.92 (.716)	.89	.71	.83	.85	.57
Harmonious Passion (DM)	5.32 (.922)	5.35 (.832)	3.71 (1.104)	5.48 (.978)	5.14 (.842)	.76	.77	.79	.89	.73
Obsessive Passion (DM)	3.93 (1.317)	3.51 (1.233)	1.75 (.970)	4.34 (1.540)	3.58 (1.244)	.86	.83	.90	.93	.86
BAS	3.21 (.351)	2.95 (.358)	1.84 (.327)	3.30 (.417)	-	.77	.70	.70	.86	-
BIS	2.80 (.503)	2.69 (.476)	-	-	-	.73	.69	-	-	-
Exercise Addiction Inventory	3.27 (.735)	2.97 (.766)	-	-	-	.72	.73	-	-	-
Impulsive Sensation Seeking	-	-	1.57 (.272)	-	-	-	-	.76	-	-
Loss of Control	-	-	1.89 (.210)	-	-	-	-	.64	-	-
Positive affect (PANAS)	-	-	-	4.16 (.647)	-	-	-	-	.91	-
Negative affect (PANAS)	-	-	-	2.35 (.997)	-	-	-	-	.92	-
Joy (PANAS)	-	-	-	4.14 (.747)	-	-	-	-	.79	-

Table 38 (continued)

*Continued: Descriptives and Internal Consistencies, for all samples*

	<i>Mean (SD)</i>					<i>α</i>				
	<i>Study</i>	<i>Study</i>	<i>Study</i>	<i>Study</i>	<i>Study</i>	<i>Study</i>	<i>Study</i>	<i>Study</i>	<i>Study</i>	<i>Study</i>
	<i>1</i>	<i>2</i>	<i>3</i>	<i>4</i>	<i>5</i>	<i>1</i>	<i>2</i>	<i>3</i>	<i>4</i>	<i>5</i>
Interest (PANAS)	-	-	-	4.22 (.681)	-				.76	-
Activation (PANAS)	-	-	-	4.12 (.680)	-				.79	-
Anger (PANAS)	-	-	-	2.58 (1.144)	-				.80	-
Low A. positive affect	-	-	-	-	3.84 (.716)	-	-	-	-	.75
High A. positive affect	-	-	-	-	4.16 (.649)	-	-	-	-	.82
Low A. negative affect	-	-	-	-	1.42 (.552)	-	-	-	-	.81
High A. negative affect	-	-	-	-	1.50 (.467)	-	-	-	-	.54
Cheerfulness	-	-	-	-	3.29 (.385)	-	-	-	-	.90
Seriousness	-	-	-	-	2.39 (.377)	-	-	-	-	.83
Bad mood	-	-	-	-	1.71 (.507)	-	-	-	-	.94

**Paper 4: Moeller, J. & Dietrich, J., Eccles, J. S., Schneider, B. (in prep.). On the stability and variability of passion. A longitudinal Experience Sampling Method approach. Manuscript in preparation.**

**Abstract**

This study proposes a new method to investigate states of passion for activities, defined as momentary experiences of strong commitment and intense affect. This study examines the extent to which passionate experiences are explained by situation-specific versus stable person-specific characteristics. Furthermore, we examine whether an individual's likelihood to experience passionate experiences remained stable across a two-year period. A longitudinal experience sampling approach was used to assess passionate experiences at the micro-time level of everyday life activities, and its' sustaining affects over a representative sample of 490 adolescents. Results show that passion has both a state and a trait component. Situational determinants accounted for 80% of variance in passion, whereas 20% of the variance in passion is accounted for by stable person-specific determinants. The person-specific component of passion remained stable with a rank-order stability ( $r = .51$ ) across a two-year period.

*Keywords:* passion, state, trait, stability, Experience Sampling Method, longitudinal study

### **Introduction**

Some individuals stay committed to a particular activity for years, even though it might demand personal sacrifices (e.g. Bloom, 1985). Such coinciding desire and long-term commitment is called passion by some psychologists (e.g. Fredricks, Alfeld, & Eccles, 2010). Conceptually, passion describes an inclination of a person towards an activity and includes state components like situational positive affect and desire, and stable components such as identification, long-term goals, and persistent investment of resources (e.g. Vallerand et al., 2003). The situation-specific and the more stable aspects of passion are most often studied separately, and most studies measure passion with methods that neither tap short-term states nor stable trait-components over time. This study disentangles short-term situational and long-term stable aspects of passion using a new method to measure passionate experiences in the moment in which they occur.

#### How passion feels like

Passion has been conceptualized as an intrinsic experience characterized by intense and mostly positive emotions and long-term commitment (e.g. Fredricks et al., 2010; Renzulli, Köhler, and Fogarty, 2006). Several explicit psychological definitions of passion have been suggested (e.g. Cardon, Wincent, Singh, & Drnovsek, 2009; Fredricks et al., 2010; Moeller & Grassinger, 2012; Renzulli et al., 2006; Sternberg, 1997; Vallerand, et al., 2003), of which three are relevant for this study: Fredricks et al. (2010), define passion as a relation of an individual to an activity. By this definition, passionate individuals desire to engage in the activity all the time, devote considerable time and energy to it, are completely involved when doing it, receive emotional release from the activity, and construct their identity in terms of their relationship to the activity.

Vallerand and colleagues' (2003) 'dual model of passion' defines it as "a strong inclination toward an activity that people like, that they find important, and in which they

invest time and energy” (p. 755). The authors state that passionate individuals identify with the activity, and that autonomous identification (cf. Deci & Ryan, 1985) leads to the adaptive harmonious passion, whereas controlled identification results in a maladaptive, obsessive type of passion. Since both types of passion are strongly correlated with the four core passion criteria (liking, finding important, investing time and energy, and declaring that the activity is one’s passion), and often moderately correlated with each other (Mageau et al., 2009; Vallerand et al., 2003; 2007; 2008), passionate experiences can be harmonious and obsessive at the same time.

Integrating commonalities of the various passion concepts in the psychological literature, Moeller and Grassinger (2013) suggest the com.pass model of passion in which they state that passion is best conceptualized as the coincidence of commitment and desire. With reference to the existing literature (e.g. Rusbult, Martz, & Agnew, 1998; Scanlan, Russell, Magyar, & Scanlan, 2009), commitment is subdivided into the three components continuous intentions to persist in the activity, long-term goals with reference to the activity, and identification with the activity. Desire, the second dimension, describes an urging approach of motivation that comes with high arousal affects of any valence (see Berridge, 2007).

**Correlates of passion.** How passion feels has been investigated previously mostly in regard to the dual model of passion (Vallerand, et al., 2003). Harmonious passion is positively related to positive emotions and well-being (e.g. Carpentier, Mageau, & Vallerand, 2012; Philippe, Vallerand, & Lavigne, 2009; Philippe et al., 2010). Harmonious passion is also positively associated with the level of concentration (e.g. Mageau, Vallerand, Rousseau, Ratelle, & Provencher, 2005; Ratelle, Vallerand, Mageau, Rousseau, & Provencher, 2004) and the feeling of being in control of an activity (Mageau et al., 2005; Vallerand et al., 2003). A hypothesized but not yet empirically studied correlate of passion is interest. Both constructs resemble each other (Fredricks et al., 2010). Particularly the concept of personal interests

(Hidi & Renninger, 2006) is very similar to passion, because both constructs describe stable person-object-relationships (Amiot, Vallerand, & Blanchart, 2006; Krapp, 2002) and imply identification, emotional intensity and importance (for interest see Hidi & Renninger, 2006; Krapp, 2002; for passion, see Moeller & Grassinger, 2012; Vallerand, et al., 2003; 2006). Also, both forms of motivation cause a person to re-approach certain objects or to re-engage in activities (Hidi & Renninger, 2006; Krapp, 2002; Renninger, 2000).

#### Research question: State versus trait components of passion

Both state and trait determinants of passion have been discussed, but there is a lack of consensus of their differences or similarities. While a state component of passion refers to intra-individual differences, that is, how a person's experience differs in various kinds of situations, a trait component refers to inter-individual differences, that is, the extent to which one person differs from another. The hypothesized situation-specific determinants of passion include person-dependent states (e.g. mood, state cheerfulness, and tiredness) and activity-specific characteristics (e.g. the interestingness of the current activity, and its contribution to the individuals' need satisfaction). Not all activities seem equally likely to elicit passion. Fredricks et al. (2010) discuss that passion will be more likely experienced in activities that are challenging, well-structured, allow for the satisfaction of basic needs (autonomy, competence, and relatedness to others), and fit to the individual's interests. These assumptions have not tested but are supported by previous findings that situational factors influence specific aspects of passionate experiences, e.g. momentary interest, desire, and aspects of commitment like the perceived importance of an activity for future goals and for the self-concept (e.g. Tsai, Kunter, Lüdke, Trautwein, & Ryan, 2008).

On the other hand, most scholars see passion as a relatively stable inclination of a person to an activity, assuming long-term persistence and person-specific determinants. The definition of passion as individual disposition to reengage and to persist in an activity

(Fredricks et al., 2010), implies behavioral stability across a variety of situations and time. Other stable aspects of passion are the component of commitment and the conceptual similarity of passion to ‘individual interest’ (see Fredricks, et al., 2010), both of which imply persistence and stability across situations and time (Rusbult et al., 1998; Scanlan et al., 2009; Klimstra, Hale III, Raaijmakers, Branje, & Meeus, 2010; Kunnen, Sappa, Geert, & Bonica, 2008; Simpkins, Davis-Kean, & Eccles, 2006). Supporting a trait-like component of passion, a number of studies have found significant correlations between passion and different personality traits (Balon et al., 2013; Wang & Yang, 2008; Tosun & Lajunen, 2009; Vallerand et al., 2006). However, cross-sectional studies prevail in the field, thus the long-term stability of passion has not yet been tested. Moreover, situational and personal components of passion are entangled in most studies. The present study investigates the hypotheses that passion has both state and trait components. In the following we describe a new method to measure in-the-moment experiences of passion in peoples’ everyday lives and to disentangle state and trait components of passion.

A new method to measure passionate experiences in people’s everyday life situations

In most studies, passion is measured with standardized self-report questionnaires (Vallerand et al., 2003) that assess a person’s evaluations about a given activity. These generalized evaluations are made by the participants by mentally aggregating across many past experiences. This makes the answers prone to aggregation bias (see Goetz, Bieg, Lüdke, Pekrun, & Hall, 2013) and memory errors. These current cross-situational measures of passion do not allow to disentangle state and trait components of passion, for instances because they do not tap the inter-situational variability of experiences.

To address this problem, we suggest to measure passionate states in the moment in which they are experienced with an experience sampling method (ESM, see Hektner, Schmidt, & Csikszentmihalyi, 2007). In ESM research, individuals are signaled by technical

devices at random time intervals and whenever being signaled they fill in short questionnaires. ESM is believed to yield valid information about individuals' experiences in large and representative samples of everyday activities (Hektner et al., 2007). An important advantage of ESM is the possibility to disentangle person-specific and situation-specific predictors of variable of interest. ESM data are hierarchically nested with repeated beeps nested within persons, and thus can be analyzed using multilevel modeling that decomposes these different sources of variance. Moreover, the mean frequency of passionate experiences in specific activities and across all activities can be assessed. The variance decomposition in situation-specific and person-specific sources enables the researcher to explore the role of person-specific characteristics such as personality traits and characteristics of the particular activity or environment at the same time.

Moreover, the ESM approach can be combined with long-term longitudinal data. Such a design additionally allows for the differentiation between two levels of time: the micro-level of situations within one individual, and the level of individuals' long-term development over a time span of several years.

### **The Present Research**

The primary aim of this study is to investigate the situational variability and long-term stability of passion in a sample of adolescents. Applying Moeller and Grassinger's (2012) model, we assessed in-the-moment experiences of passion in terms of coinciding strong commitment and motivational intensity (operationalized as affect intensity). We expect this to be a valid measure of passionate states in an ESM context. Its validity is tested by examining relationships between passion and other constructs that are known to correlate with passion in previous studies. We predict that passion is positively associated with experiences of interest, happiness, enjoyment, concentration and control during that activity.



After probing the validity of the situational passion measure, we disentangle the state and trait components of passion. We expect that characteristics of specific everyday life situations determine strongly whether an individual has a passionate experience in a current activity. Additionally, we expect to find stable inter-individual differences in terms of how often individuals make passionate experiences in general. We hypothesize that the disposition of a person to have many or few passionate experiences remains relatively stable in terms of mean-level and rank-order stability over a period of two years.

The research questions are investigated using a longitudinal ESM approach in a sample of adolescents across a period of two years. An important innovation of this study is the level of abstractness on which passion is examined: Unlike previous studies which investigated passion *for one specific activity* (hobbies or professions, e.g. playing soccer), we examine the question of whether people differ in their general tendency to report many or few passionate experiences *across all their everyday life activities*.

## Methods

### Participants and Procedure

The data originate from the focal group of the Alfred P. Sloan Study of Youth and Social Development (Schneider, 1992-1997; Csikszentmihalyi & Schneider, 2000). The Sloan Study investigated a representative sample of U.S. adolescents. Urban, suburban and rural locations of data collection were balanced, so were school types (middle schools and high schools). In a cohort sequence design, adolescents of different cohorts (6<sup>th</sup> graders, 8<sup>th</sup> graders, 10<sup>th</sup> graders and 12<sup>th</sup> graders) were surveyed in 1992; 1994 and 1997. In each wave, ESM data were gathered on seven consecutive days with eight data assessments per day. Each participant repeatedly filled out questionnaires whenever beeped by a wristwatch. The resulting data are hierarchically structured with beeps (within-level) nested in individuals (between-level).

The analysis sample comprised 490 students and two waves of data collection. Adolescents from grades 6, 8 and 10 (at wave 1) were included in the analysis if they had participated in the data collection in the first and second wave. In the first wave, the sample comprised of 175 sixth graders, 169 eighth graders and 146 tenth graders. 61.0% were female, the average number of beeps per person was 36.3. 5.3% of the adolescents lived in poor communities, 16.9% lived in working-class communities, 38.6% lived in middle class communities, 23.7% in upper middle class and 15.5% in upper class communities.

### Measures

**Passion** was operationalized with measures of commitment and affect intensity, for details and scale anchors see Table 1. Commitment was measured as the average of a single item assessing long-term goals and a four-item scale measuring identification with the activity ( $\alpha$  for the identification subscale = .629). Affect intensity was measured as the average of two items concerning involvement and excitement ( $\alpha$  = .681). These indicators were chosen because they were the clearest measures for affective intensity (or arousal) and were least contaminated with measures of affective valence (positive or negative). Because passion indicators were measured on different scales (see Table 39), each item was first rescaled using the proportion of maximum scoring method (Little, 2013). This monotonous transformation results in a scale ranging from 0 to 1 for each variable and does not change the distribution of the variables. After the rescaling, scales for commitment and for affect intensity were computed as means of the corresponding items or subscales, respectively. Then, each beep was dummy coded as a passion beep vs. non-passion beep. A beep was defined as passion beep (coded “1”) if both the value for commitment and the value for affect intensity were above the midpoint of the scale<sup>14</sup> (commitment > 0.5 and affect intensity >

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<sup>14</sup> We did not use the individual mean for the dichotomization, because any standardization within persons would have obfuscated the inter-individual differences we were interested in.

0.5). All other beeps with values below the midpoint of the scale for commitment and /or affect intensity were coded as non-passion beeps (coded “0”).

Table 39

*Construction of the Passion Measure*

<b>Subscale</b>	<b>Specific component</b>	<b>Items</b>	<b>Measure</b>
Commitment	Long-term goals	- “Indicate how you felt about the main activity: How important was it in relation to your future goals?”: 1 = <i>not at all</i> to 9 = <i>very much</i> .	single item
	Identification	- “Were you living up to your expectations?”: 1 = <i>not at all</i> to 10 = <i>very much</i> ; - “Was this activity important to you?”: 1 = <i>not at all</i> to 9 = <i>very much</i> ; - “Did you feel good about yourself?”: 1 = <i>not at all</i> to 10 = <i>very much</i> ; - “Describe your mood as you were beeped”: 1 = <i>very ashamed</i> to 7 = <i>very proud</i> .	scale as mean of these items; Cronbach’s alpha = .629
	Continuous intent to engage & persist	<i>Not assessed</i>	<i>Not assessed</i>
Affect Intensity	High arousal	- “Describe your mood as you were beeped”: 1 = <i>very detached</i> to 7 = <i>very involved</i> ; - “Describe your mood as you were beeped”: 1 = <i>very bored</i> to 7 = <i>very excited</i> .	scale as mean of these items; Cronbach’s alpha = .681

**Validation criteria.** As correlates of passion we assessed enjoyment, happiness, concentration, and interest at each beep and within both waves of data collection. The items of each wave were subjected to a multilevel Exploratory Factor Analysis. A model with unrestricted correlations on the within-level and one factor on the between-level fitted the data

best ( $\chi^2(9) \leq 116.509$ ;  $p \leq .000$ ,  $RMSEA \leq .017$ ,  $CFI \geq .989$ ,  $TLI \geq .965$ ,  $SRMR_{within} \leq .000$ ;  $SRMR_{between} \leq .062$ ). Therefore, the correlates were analyzed as single items and not aggregated in scales. The correlates were measured as single items as follows: enjoyment (“Did you enjoy what you were doing?”), concentration (“How well were you concentrating?”), and control (“Did you feel in control of the situation?”), all of which were assessed with a scale from 1 = *not at all* to 10 = *very much*, happiness (“Describe your mood as you were beeped”: 1 = *very sad* to 7 = *very happy*), and interest (“Was this activity interesting?”: 1 = *not at all* to 9 = *very much*).

**Demographic characteristics.** For descriptive reasons we examined whether passion was associated with demographic characteristics. Participants’ gender was coded 1 = *male*, 2 = *female*). Age was only assessed indirectly in form of variables coding the participants’ cohort, i.e. the participants’ grade level in the first wave of data collection. The socioeconomic status of the participants’ community was assessed in a discrete variable (codes: 1-poor, 2-working class, 3-middle class, 4-upper middle class, 5-upper class).

### Analysis

Data were analyzed using multilevel modeling with robust maximum likelihood estimation in the Mplus 6 statistical program (Muthén & Muthén, 2010). The Person ID was used as cluster variable in a two-level regression model. At the within-level the variance between several beeps within a person was estimated and on the between-level the variance between persons was estimated. In order to limit the number of estimated parameters, we run a total of seven models, one model only including the passion measures for the two measurement time points ( $passion_{wave1}$  and  $passion_{wave2}$ ), and six models including these passion measures and one correlate variable at a time at two measurement time points.

To further explore the person-specific determinants of passion, we examined whether demographic characteristics were related to passion. We regressed passion at both waves on gender, age, and socioeconomic status as between-level predictors.

The relative frequency of passionate experiences for each activity was compared descriptively. In order to avoid random findings, only activities with 30 and more beeps were included.

### Results

The concurrent validity of the applied passion measure was supported by the findings that passion was significantly positively related to all validity criteria (interest, enjoyment, happiness, concentration, and control) both the level of situations (within-level;  $.115 \leq r \leq .284$ ) and on the level of individuals (between-level) Within a given wave of data collection, individuals who reported many passionate experiences (across all activities in which they were beeped) also reported high levels of interest, enjoyment, happiness, concentration and control across all activities ( $.352 \leq r_{\text{between-level}} \leq .644$ ). Most of these links between passion and its correlates remained significant across a period of two years ( $.150 \leq r_{\text{between-level}} .419$ ). For instance, an individual's frequency of passionate experiences in wave one was significantly related to the individuals' level of interest, enjoyment, happiness, concentration and control two years later. Results are summarized in the following table.

Table 40

*Intraclass Correlations, Stability of Passion, and Correlations of Passion with Validity Criteria*

	<i>Correlation with Passion</i>				
	<i>ICC</i>	<i>Within-level</i>		<i>Between-level</i>	
		Wave 1	Wave 2	Wave 1	Wave 2
Passion <sub>wave1</sub>	.220	-	-	-	.514 <sup>a</sup>
Passion <sub>wave2</sub>	.176	-	-	.514 <sup>a</sup>	-
Enjoy <sub>wave1</sub>	.193	.170	-	.567	.307
Enjoy <sub>wave2</sub>	.176	-	.198	.404	.596
Concentration <sub>wave1</sub>	.272	.199	-	.507	.330
Concentration <sub>wave2</sub>	.254	-	.237	.419	.502
Happy <sub>wave1</sub>	.335	.261	-	.644	.376
Happy <sub>wave2</sub>	.277	-	.284	.396	.624
Interest <sub>wave1</sub>	.207	.231	-	.495	.301
Interest <sub>wave2</sub>	.183	-	.245	.262	.586
Control <sub>wave1</sub>	.351	.115	-	.352	.150
Control <sub>wave2</sub>	.315	-	.134	.223	.391

*Note.* ICC = Intra-class correlation; <sup>a</sup> = coefficient for the rank-order stability of passion across two years; All correlations were significant ( $p \leq .05$ ); - = fixed at zero. The within-level concerns the variance between beeps but within persons. The between-level concerns variance between persons. The model fit indices satisfying for all models,  $\chi^2(12) \leq 28.088$ ;  $p \leq .013$ , Root-Mean-Square-Error-of-Approximation (RMSEA)  $\leq .013$ , Comparative-Fit-Index (CFI)  $\geq .976$ , Tucker-Lewis-Index (TLI)  $\geq .929$ , Standardized-Root-Mean-Square-Residual on both levels (SRMR<sub>within</sub>  $\leq .020$ ; SRMR<sub>between</sub> = .001).

To quantify the percentage of variance in passion that is explained by differences between individuals, we computed intra-class correlations (ICCs, Table 40). Results showed that round 80% of the variance was due to situation-specific events. 18% of the variance in passion at wave one and 22% at wave two were explained by inter-individual differences.

The findings of a trait component was supported by the considerable rank-order stability of passion across the two years ( $r = .514$ ). Adolescents who had many passionate experiences at wave 1 were likely to remain high on passion two years later (see Table 40). Concerning mean-level stability our results showed that on average participants had passionate experiences about 25% of the time. This figure did not change significantly across time (Satorra-Bentler Scaled  $\chi^2 = 2.67$ ,  $df = 1$ ;  $0.1 > p > .05$ ). To further explore the person-specific determinants of passion, we examined whether gender, age, and socioeconomic status predicted passion on the between-level. There were no systematic effects of these demographic variables on passion (see Table 41).

Table 41

*Summary of Regression Analysis for passion (N = 443)*

Variable	<i>Passion<sub>wave1</sub></i>					<i>Passion<sub>wave2</sub></i>				
	<i>B</i>	<i>SE(B)</i>	$\beta$	<i>t</i>	<i>p</i>	<i>B</i>	<i>SE(B)</i>	$\beta$	<i>t</i>	<i>p</i>
Gender <sup>a</sup>	.017	.021	.039	.787	.431	.038	.020	.102	1.896	.058
SES	-.038	.010	-.205	-4.086	.000	-.002	.009	-.009	-.166	.868
6 <sup>th</sup> grade (dummy) <sup>b</sup>	.013	.026	.030	.510	.610	-.014	.027	-.035	-.493	.622
8 <sup>th</sup> grade (dummy) <sup>c</sup>	.000	.024	.000	.009	.993	-.039	.022	-.102	-1.786	.074

Notes.  $R^2(\text{Passion}_{\text{wave1}}) = .047$ ;  $R^2(\text{Passion}_{\text{wave2}}) = .019$ ; <sup>a</sup>coded 1 = male, 2 = female, <sup>b</sup>coded 0 = 8<sup>th</sup> & 10<sup>th</sup> graders, 1 = 6<sup>th</sup> graders, <sup>c</sup>coded 0 = 6<sup>th</sup> & 10<sup>th</sup> graders, 1 = 8<sup>th</sup> graders.

To explore the situation-specific determinants of passion, we compared the different activities in terms of how often they elicited passionate experiences. The activity that was most often experienced passionately (65% of all beeps) was “kissing, hugging, flirting” (Table 42). The upper quartile of activities that most often elicited passionate experiences included e.g. musical activities in and outside school, interactions with the individuals’ boy- or girlfriends, drama and sports both as curricular and extracurricular activities, even genuine

learning activities like lab work, and work outside school. Many of these activities with high percentages of passionate experiences occurred in school contexts, including specific lessons. In contrast, the lowest quartile of activities with the lowest percentage of passionate experiences mostly included passive activities such as watching TV, recreational and other erratic activities such as sleeping, sitting, waiting (see Table 43). All of these rarely passionate activities occurred out of school contexts..

### **Discussion**

This study investigated three main research questions: First, is the applied measure for momentary passionate experiences valid? Second, to what extent is the experience of passion specific to situations versus individuals? And third, if passion has an individual differences component, how stable is it across time?

Our results confirmed the validity of the measure for passionate experiences (i.e. situations of high commitment and motivational intensity). As hypothesized, passion was associated with enjoyment, interest, happiness, concentration and feelings of control, both across individuals and within individuals in specific situations. This is consistent with the concept of passion as a mainly positive experience (Cardon et al., 2009; Fredricks et al., 2010; Renzulli et al., 2006) and with previous findings regarding correlates of harmonious passion (Carpentier et al., 2012; Mageau et al., 2005; Ratelle et al., 2004; Vallerand et al., 2003). Moreover, our finding of positive correlations between passion and interest supports the claim that both are related but distinct constructs (Fredricks et al., 2010). To our knowledge, this is the first study to show that not only do highly passionate people have more positive experiences, but that also passionate situations are experiences more hedonic than non-passionate situations, irrespective of an individual's general tendency to be passionate.

Regarding the state-trait-question, we found that the larger share of the variance was due to differences between specific everyday life situations. This suggests that future studies



on the question why certain people experience passion for certain activities should apply state-sensitive measures of passion and focus on situation-specific determinants of passion.

Our findings also support the hypothesis that being passionate does have an individual differences component (Balon et al., 2013), which, in our study, explained roughly 20% of the variance. As expected, we found that individual differences in passion were relatively stable across two years, both in terms of rank-order and mean level stability, meaning there was no overall increase or decrease in passion, and individuals tended to keep their passion level over time. Taken together these findings corroborate current psychological definitions of passion as a stable relation of a person towards activities (Fredricks et al., 2010; Vallerand et al., 2006). Our study offered a new methodological perspective based on assessing passion in the situation when it occurs.

Our findings further support the notion of passion as a relatively rare experience (Fredricks et al., 2010). In contrast to the previous findings that adolescents virtually never report manifest passion for particular school activities in general self-reports (Fredricks et al., 2010), we found with state-sensitive measures of passion that several in-school activities belong to the activities that most often elicit passionate experiences. This emphasizes the necessity of state-sensitive measures in the research of optimal learning experiences.

A number of limitations should be considered when interpreting the findings of this study. First, focusing on general core criteria of passion we did not distinguish between harmonious and obsessive forms of passion for which occurrence and development might be different. Consequently, we cannot generalize our results to all specific types of passion because they might be different for obsessive passion, so further longitudinal studies on the development of obsessive passion are needed. Second, our measurement of passion was constrained by the study's nature as secondary data analysis, and our findings are limited to the abstraction level of the across-activity frequency of passionate experiences. Moreover, our sample comprised of mid- to late adolescents, and further research is needed to investigate

whether adults show similar amounts of change and stability in passion. Moreover, this study did not address the exact nature of the individual difference component of passion, which could consist of any personal characteristics that remain invariant across the assessed situations within the wave of data collection, for example personality traits, or other stable personal attributes like attitudes, access to resources or demographic characteristics beyond those that were assessed here.

Notwithstanding these limitations, our study is the first that systematically addressed the change and stability of passion across an extended period of time, thus providing support for current psychological theories of passion from a new methodological angle. Importantly, our findings corroborate the claim that the experience of passion is partially influenced by stable person characteristics. Future research should clarify the nature of these characteristics. Finally, since passion is typically conceptualized as a relationship of a person toward an activity, future research should shed light on both sides of this relationship with ESM and other methodologies, also addressing possible interactions between person and object characteristics.

### Appendix

Table 42

*Intraclass correlations, descriptive statistics, and rank-order stability (between level).*

	Var(w)	Var(b)	Mean(b)	Rank-order stability(b) <sup>a</sup>
Passion <sub>wave1</sub>	.154	.043	.273	.514
Passion <sub>wave2</sub>	.156	.033	.256	
Enjoy <sub>wave1</sub>	.100	.024	.614	.526
Enjoy <sub>wave2</sub>	.095	.020	.576	
Concentration <sub>wave1</sub>	.089	.033	.567	.544
Concentration <sub>wave2</sub>	.085	.029	.560	
Happy <sub>wave1</sub>	.044	.022	.710	.658
Happy <sub>wave2</sub>	.039	.015	.666	
Interest <sub>wave1</sub>	.105	.028	.503	.598
Interest <sub>wave2</sub>	.099	.022	.467	
Control <sub>wave1</sub>	.069	.037	.699	.489
Control <sub>wave2</sub>	.068	.031	.678	

*Note.*  $Var(w)$  = variance on the within-level.  $Var(b)$  = variance on the between-level. Since the variables for passion was dichotomized (0 for “no passion beep”, 1 for “passion beep”), its mean value can be interpreted as percentage of passionate experiences in all experiences. All other variables also range from 0 to 1 but their mean values do not reflect percentages but rather degrees of experienced enjoyment, concentration, and so on.

<sup>a</sup>Stability of variables across two years (correlations on between-level).

Table 43

*The upper quartile of activities that most often elicited passionate experiences*

Primary activity when being beeped	Place: in or outside school?	% Passionate Experiences	Absolute frequency of mentioning
Kissing, hugging, flirting	outside school	64.9	37
Playing musical instrument	outside school	62.1	34
Talking with boyfriend / girlfriend	outside school	58.8	97
Athletic activities (including watching at them)	extracurricular in school	56.7	147
Music (lesson)	in school	56.5	189
Music (extracurricular)	extracurricular in school	51.3	62
Doing sports / games (unspecific)	outside school	48.5	425
Extracurricular activity in school (unspecific)	extracurricular in school	48.4	58
Music hobby	outside school	47.1	255
Talking to Teacher	in school	46.6	61
Drama (lesson) <sup>15</sup>	in school	45.9	35
Computer Science / Programming (lesson)	in school	45.7	78
Athletic hobby	outside school	44.9	225
Labwork with group	in school	44.4	51
Religious events	outside school	43.1	118
Participation in discussion	in school	42.4	131
Labwork alone	in school	41.3	46
Individual work	in school	41.2	1195
General Science (lesson)	in school	40.6	124
Reading	in school	40.3	212

<sup>15</sup> Drama as extracurricular activity in school is even in 62% of all beeps a passionate experience, but was only mentioned 29 times and is therefore not included in this table.

Table 43 (continued)

*The upper quartile of activities that most often elicited passionate experiences*

Primary activity when being beeped	Place: in or outside school?	% Passionate Experiences	Absolute frequency of mentioning
Business Skills (lesson)	in school	39.4	54
At work, not paid	outside school	39.2	41
Art hobby	outside school	39.0	109

Note. Only activities with 30 and more beeps were included here.

Table 44

*The lowest quartile of activities that most rarely elicited passionate experiences*

Primary activity when being beeped	Place: in or outside school?	% Passionate Experiences	Absolute frequency of mentioning
Listening to radio / stereo (unspecific)	outside school	10.3	87
Thinking about friends	outside school	11.1	45
Watching TV (unspecific)	outside school	11.1	2692
Sleep / napping/ relax /resting	outside school	11.1	1053
Watching Sitcoms, Soaps or shows in TV	outside school	12.5	320
Watching a movie or drama in TV	outside school	13.0	308
Filling out questionnaire	outside school	15.4	39
Thinking about oneself	outside school	14.6	89
Thinking about going home	outside school	15.4	52
“Doing Nothing“	outside school	15.5	414
Playing Video Games / Nintendo	outside school	15.7	344
Watching video	outside school	16.3	129
Listening to music	outside school	17.0	370
Doing housework / chores	outside school	17.9	876
Arguing, fighting, yelling	outside school	18.2	121
Snacking	outside school	18.0	362
Sitting / Standing	outside school	17.02	987
Waiting to do something	outside school	17.8	444
Dazing / Daydreaming	outside school	18.1	381
Watching movie or theater (unspecific)	outside school	19.6	56
Personal care, groom	outside school	20.4	1140
Walking, transit	outside school	20.0	1217
Playing with pets	outside school	20.2	84

Note. Only activities with 30 and more beeps were included here.

## **Part III. General Discussion**

### **Synopsis of the Present Thesis**

This thesis investigated the psychological concept of passion for activities. It started with a literature review (Moeller & Grassinger, 2013). This review described different passion concepts across time and disciplines, gave an overview about implicit and explicit psychological passion concepts, discussed similarities between the concepts passion and commitment, and suggested the commitment and passion (com.pass) model, which integrates commonalities of various explicit psychological passion definitions with the concept of commitment. The com.pass model defines passion as coincidence of commitment with desire, and assumes that the general degree of passion matters for the prediction of relevant criteria, independent of the type of passion.

The basic assumptions pertaining to the concept of passion that had been identified in the review article were then investigated in several empirical studies with a variety of research methods and types of analyses, including cross-sectional questionnaire surveys and longitudinal experience sampling studies, variable-oriented and person-oriented approaches, primary and secondary data analyses. The second paper (Moeller & Grassinger, in prep.) reports the development of a new scale for the assessment of passion, commitment, and their specific components according to the definition of these concepts in the previously developed com.pass model. The com.pass scale resulted to be a reliable and valid measure. The article suggests items for different versions of the scale, including a short version and a German, Portuguese and an English item set. The assumption that commitment is a central component of passion was supported in comparisons of structural equation models. Furthermore, cluster analyses indicated that individuals differ in their general degree of passion (high versus low). In contrast, the assumption that individuals differ in their type of passion (harmonious versus obsessive, see Vallerand et al., 2003) was not supported by the analyses. This supports the



emphasis of the com.pass model on the general degree of passion and shown the relevance of assessing this general degree of passion with the com.pass scale.

The third paper (Moeller, Keiner, et al., in prep.) reported several studies on the relation of passion to affect- and reward-related personality facets and to symptoms of dependency. It was found that passion was positively correlated with the disposition to experience positive emotions ('liking') as well as the stable tendency to experience approach motivation ('wanting'). Also, positive correlations between passion for activities and measures of non-substance related dependency were expected and found, and explanations for this connection were discussed. The previous findings that the degree rather than the type of passion distinguished between homogeneous groups of individuals (see Moeller & Grassinger, in prep.) were replicated in this study, and it was found that individuals in the high passion cluster also had higher scores in positive trait affectivity and measures of trait approach motivation than those of the low passion cluster, but both clusters did not differ in their average degree of negative trait affectivity. Given that the investigated personality traits are relatively stable dispositions, it can be assumed that they preceded the development of passion to a particular activity. In the light of this assumption, the found correlations between personality traits and passion are interpreted as indicators for a causal effect of reward sensitivity and dispositional positive affect on the development of passion.

The fourth and last paper tested the assumptions that passion remains stable across long time spans, and that the experience of passion is determined by person-specific and situation specific characteristics. This study investigated momentary experiences of passion in everyday life, disentangled person-specific and situation-specific sources of variance on the experience of passion, and investigated the long-term stability of passion across two years. These questions were studied in a secondary data analysis of longitudinal Experience Sampling Method data in a representative sample of U.S. American adolescents (Moeller, Dietrich, et al., in prep.). The study revealed that differences between specific situations

accounted for about 80% of the variance in the momentary experience of passion, while round 20% were explained by person-specific determinants. The person-specific likelihood to make many versus few passionate experiences in everyday life remained relatively stable across a period of two years, which is interpreted as an indicator of the involvement of stable personality traits in the experience of passion.

Altogether, the empirical studies that were reported in the second, third and fourth article (Moeller & Grassinger, in prep.; Moeller, Keiner, et al., in prep.; Moeller, Dietrich et al., in prep.) substantiate and support the theoretical assumptions of the com.pass model (Moeller & Grassinger, 2013). In sum, this thesis has 1) integrated the previous research about passion and commitment within a new model, 2) provided a corresponding measurement instrument with good psychometric properties that can operationalize the components of the previously developed model, and 3) tested several central assumptions of the previously developed model and other definitions of passion, for instances the assumption that commitment is a central component of passion, that personality traits are involved in the experience of passion, that individuals primarily differ in their general degree rather than their types of passion, and that passion remains stable across a long time span.

### **Insights and Further Assumptions About the Impact of Person-Specific and Activity-Specific Influences on Passion**

As expected, several studies brought evidence for the implication of both inter-individual and inter-situational differences in passion, which substantiated the concept of passion as a person-activity relationship, and which hopefully encourages future studies to shed more light on the person-specific and the activity- or situation-specific determinants of passion, and the ways they interact. A very general visualization of the ways in which person-specific and activity-specific characteristics might influence the experience of passion is shown in Figure 7 and discussed below.

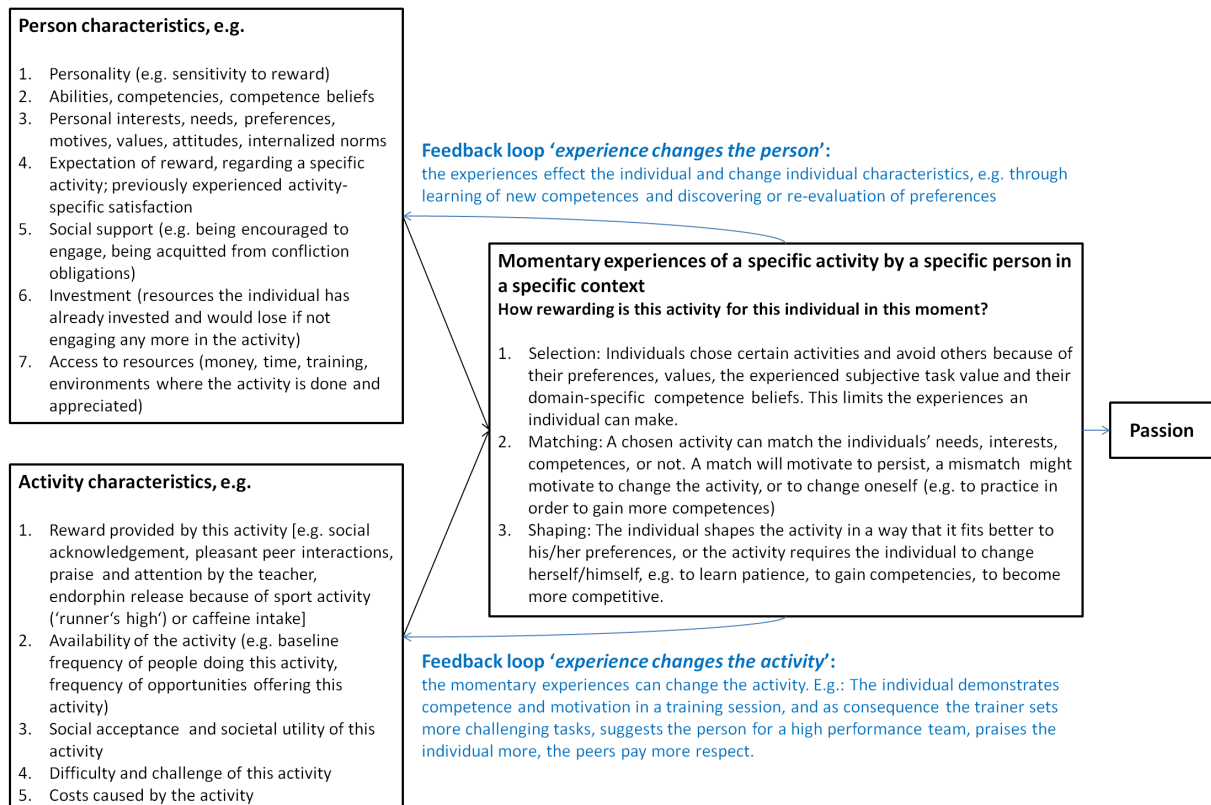


Figure 7: Pathways of possible interactions between person-specific and activity-specific determinants of passion

### Discussion of Person-Specific Determinants of Passion

The studies two, three and four of this thesis have shown that not all activities and situations are equally likely to be experienced passionately. Expectedly, activities that are generally popular leisure activities are more often explicitly mentioned to be a personal passion than activities which are rare leisure activities in the studied sample (Moeller & Grassinger, in prep). Particularly sports, social activities, digital media and social networks and music were popular and also often mentioned as passions in the studied samples. But apart from the base rate popularity of an activity, other, more specific characteristics of activities are related to the probability to experience these activities in a passionate or non-passionate manner. As Moeller, Dietrich, et al. (in prep.) have shown, the most often passionately experienced activities and the least often passionately experienced activities

clearly differ in their content. The most often passionately experienced activities require active engagement, are often goal-directed (e.g. work, lab work) and several of them (e.g. sports, music, and kissing) are known to elicit the feeling of reward and the desire to repeat the activities by causing the release of endorphins and consequently, euphoria (see Cohen et al., 2009; Dunbar, Kaskatis, MacDonald, & Barra, 2012; Hawkes, 1992; Boecker et al., 2008; Raichlen, Foster, Gerdeman, Seillier, & Giuffrida, 2012). In contrast, the least often passionately experienced activities in the study from Moeller, Dietrich, et al. (in press) were passive, recreational, mostly goal-less and unchallenging activities, such as e.g. sleeping, waiting, and watching TV. These findings indicate that specific aspects of the activity, such as e.g. its accessibility and popularity, but also its general potential to elicit experiences of reward and euphoria, challenge and clear goals, influence the likelihood and degree of passionate experiences in the respective activities. Other aspects of activities that were not studied in this thesis but might also influence the probability of passionate experiences by triggering interest, commitment, and desire, are e.g. the societal acceptance for this activity, the societal utility of this activity (see e.g. Hullemann, Godes, Hendricks, & Harackiewicz, 2010), objective difficulties and challenges of this activity (Shernoff & Csikszentmihalyi, 2009), and the costs caused by the activity (see e.g. Wigfield & Eccles, 1992). It still has to be tested whether and how these activity characteristics contribute to the experience of passion.

### **Discussion of Activity-Specific Determinants of Passion**

On the other hand, the studies of Moeller, Dietrich, et al. (in prep) and Moeller, Keiner, et al. (in prep.) indicated that stable personality characteristics such as the dispositional sensitivity to reward and positive trait affectivity are related to the degree and probability of experienced passion. Beyond the personality traits that were studied in this thesis, other characteristics of the person might also influence the likelihood and degree of experienced passion and the specific content of the activities that a given individual can

experience passionately. Person characteristics that might influence the experience of passion by facilitating the repeated experience of interest, reward, and towards activities are for instances 1) Abilities, competencies, competence beliefs (see e.g. Wigfield & Eccles, 1992), 2) personal interests, needs, preferences, motives, values, attitudes, internalized norms (see e.g. Tsai et al., 2008; Sansone, Weir, Harpster, & Morgan, 1992), 3) expectation of reward regarding a specific activity; previously experienced activity-specific satisfaction (see e.g. Scanlan et al., 2009, 4) social support (e.g. being encouraged to engage, being acquitted from confliction obligations), 5) previous investments (resources the individual has already invested and would lose if not engaging any more in the activity; see e.g. Scanlan et al., 2009) and access to resources (money, time, training, and environments where the activity is done and appreciated). Particularly the passion characteristic to persist in a course of action despite aversive experiences and obstacles seems to be influenced by stable personality traits, particularly by conscientiousness (De Fruyt, Van De Wiele, & Van Heeringen, 2000) and related constructs (Duckworth et al., 2007). The influence of these personality characteristics on the development of passion need to be tested in future studies.

### **Discussion of Possible Interactions Between Person-Specific and Activity-Specific**

#### **Determinants of Passion**

Given that passion is conceptualized as the inclination of a person to an activity, it can be assumed that both the mentioned person- and activity-specific characteristics will influence the development of passion, and that there will be interactions of these two sources of influence. Three possible ways of interactions of person- and activity characteristics are discussed in the following: selection, matching, and shaping (there might be more ways). Selection means that individuals chose certain activities and avoid others because of their preferences, values, their access to required resources, the experienced subjective task value and their domain-specific competence beliefs. This limits the experiences a particular

individual can make, and possibly his / her probability to engage in more or less rewarding activities. Matching means that once the decision is made, a chosen activity can match the individuals' needs, interests, competences, or not. A match will motivate the individual to persist, a mismatch might motivate to change the activity, or to change oneself (e.g. to practice in order to gain more competences). Constellations with a person-environment fit are known to be more satisfying than constellations of a mismatch (e.g. Greguras & Diefendorff, 2009). Shaping describes the process in which the individual shapes the activity in a way that it fits better to his/her preferences, or the activity requires the individual to change herself/himself, e.g. to learn patience, to gain competencies, to become more competitive. These processes seem likely to influence which individuals experience in which activities which degrees, and types of passion. Previous studies have often shown in other contexts that the specific experiences of individuals in activities affect backwards both the person characteristics and the activity characteristics. For instance, an initial matching of personal interests and activity contents might motivate the individual to stay, practice, and learn, which is likely to affect both his / her competences, competence beliefs, maybe preferences on the side of the person. Likewise, the activity itself might be changed by this match if the trainer recognizes the motivation of the individual, therefore praises more or selects more challenging tasks. In other words: The initial characteristics of individuals and activities probably determine an individual's experiences of a given activity in a given moment, but these momentary experiences are also likely to change the person and the activity in iterative feedback loops. These assumptions are based on the findings of previous studies about related topics, but have not yet been investigated in the context of passion. More research is needed to clarify the exact impact of specific person- and activity characteristics on passion. Further directions for the future research are discussed in the following.

### **Open Remaining Research Questions and Directions for Future Research**

Still many questions remain unanswered to be investigated in the future research. They concern the lack of consensus about definitions, components, and measurements of passion, the lack of explanation for the functioning and interaction of the different components of passion, the lack of evidence for the incremental validity of passion over other constructs, the lack of process models for the explanation of the development of passion and the related constructs, the controversy to what extent the difference between harmonious and obsessive passion accounts for inter-individual differences. A limitation of the previous research is the fact that most studies rely on self-report questionnaires. Future studies should apply a larger variety of more objective and in-the-moment assessments of passion. Moreover, most of the previous studies investigated passion in very selected, ergo not representative samples of individuals who are intensively engaged in an activity. Future studies should include representative samples and drop-out analyses in order to find out how passion is related to the persistence versus drop-out of the relevant activities.

The unanswered research questions and directions for the future research are described in detail below.

#### **Need for Consensus About Definitions, Components, and Measures of Passion.**

First reviews have tried to remedy the existing ambiguities in the research on passion by integrating similar definitions (Cardon, Wincent et al., 2009; Moeller & Grassinger, 2013), but still most current publications refer to only one definition and measure of passion, while interpreting their findings as valid insights about passion in general. The previous fragmentation of passion definitions has led to the situation that nobody can now for sure whether research findings concerning one measure hold true for other measures of passion. Differences between measures can be expected because of their different conceptualization and because there is first empirical evidence that they function differently, for example in the

cut-off for distinguishing between passionate and non-passionate individuals (compare Fredricks et al., 2010 with Vallerand et al., 2003 and Bonneville-Roussy et al., 2011). In order to make sure that findings are interpretable and generalizable beyond the applied measure, we need more knowledge about the (in-)variance between different definitions and measurement instruments of passion. It would be desirable to achieve a consensual integration of the different approaches within one framework. It should be discussed which operationalization of passion is most adequate: Is general passion a dichotomous or continuous variable? If it was dichotomous, where to draw the line? The currently applied cut-off at the scale midpoint seems arbitrary, so the future research should determine better criteria for the distinction between passionate and non-passionate individuals. The specific components of passion should inform the general passion score in a theoretically sound and empirically insightful way. Instead of averaging them, they should be integrated in a measurement model that represents their assumed interaction and functioning, e.g. in multiplicative models or threshold models, or whatever model the future discussions approve.

### **Particular Functioning and Interactions of Specific Components**

The explicit definitions of passion all conceptualize passion as a multifaceted construct with different components (e.g. identification, desire), but most studies do not address the particular functioning and interaction of these facets. Consequently, the contribution of the specific components to the explanation of the relevant outcomes of passion is unclear and should be clarified in future studies. One of the strengths of the construct is its integration of short-term motivational intensity with aspects of long-term commitment, which is an important research desideratum (Katz, 1999, Duckworth et al., 2007). This potential to bridge previously separated research lines within a joined framework is lost if the mechanisms through which the components influence the outcomes are not explained in testable models and empirical studies. The distinction between specific components of



passion and their interactions promises new insights because it is known that studies assessing specific facets (e.g. of personality) are generally more informative and better interpretable than those relying on higher-order factors (Armstrong & Anthony, 2009; Beauducel, et al., 2007; Bipp et al., 2008; Schimmack et al., 2004). The distinction between specific components could also help to avoid redundancies in relation to other constructs. It is redundant to find empirically positive correlations between constructs whose theoretical definitions overlap in specific components, but it would be insightful to find out how the conceptually distinct components of passion are related to other constructs and assumed outcomes. For this purpose, studies on the relation of passion to other multi-faceted construct should address the relations between the specific facets separately.

### **Incremental Validity**

According to the principle of parsimony, the establishment of a new construct is only justified if this new construct explains a relevant phenomenon to a further extent than the already existing constructs. It is unknown whether passion explains any relevant phenomenon better than the previously established constructs. Although first findings indicate incremental validity of passion over sport commitment in the explanation of indicators of deliberate practice (see Moeller & Grassinger, in prep.), these findings are limited because they are based on self-reports and consequently prone to response bias and inflated correlations and they were only investigated in one study and activity context (soccer). In order to make sure these findings can be generalized it is necessary to replicate the study with alternative and more objective measures passion and particular for the criterion deliberate practice, and to find out whether the findings are independent of the specific activity context.

Systematic studies on the incremental validity of passion over the related construct are needed, and this preresquires a systematical identification of the overlapping constructs. The incremental validity requires that passion contributes additional explanation of the relevant

criterion after *all* similar constructs are taken into account. Eventual findings of incremental validity of passion over one or two related constructs would be only one piece of the puzzle. Ideally, future studies on the incremental validity should use the theoretically most important outcomes of passion as criteria. If the incremental validity of passion could be shown, it would be interesting to know which specific components account for it, whether it differs for the general degree and the harmonious and obsessive type of passion, and whether there is also incremental validity in the *prospective* prediction of relevant criteria by passion in comparison to other constructs.

### **Process Models for the Explanation of the Long-Term Development of Passion, Predictors and Outcomes**

There is a lack of process models that could explain the development of passion, and also a lack of empirical studies about the assumptions of the existing assumptions concerning the development, predictors and outcomes of passion. The long-term stability of passion and its long-term effects on desired outcomes are often assumed, but not yet proven. The assumed impact of passion on long-term persistence is one of the most important arguments for the usefulness of this new construct (see above), but this assumption still has to be tested in adequate longitudinal studies. Future studies should investigate 1) whether passion remains stable across long time spans, 2) whether passion *prospectively* predicts the long-term development of practice, performance, and other relevant criteria, and if so, 3) whether passion *prospectively* predicts these criteria better than other constructs which were also related to long-term persistence. If passion shall explain the success of high performing experts, as suggested by Bonneville-Roussy et al. (2011), then we might need to investigate its development and effects across the time span that is required for becoming an expert, that is, across 10.000 hours and ten years of deliberate practice. This means that our knowledge about the long-term relevance of passion will remain limited for a while and should be

interpreted cautiously until conclusive evidence is reported. The previous short-term longitudinal studies with time lags of maximally twelve months (e.g. Mageau et al., 2009; Philippe et al., 2010) are not conclusive enough for this question.

Furthermore, longitudinal studies are also required for the clarification of predictors of passion. A central assumption of the dual model of passion claims that harmonious passion results from the autonomous internalization of an activity and obsessive passion from the controlled internalization (Vallerand et al., 2003). However, very few studies assessed the *preceding* determinants of passion *before* the passion developed (e.g. Mageau et al., 2009; Vallerand et al., 2006), so we do not know conclusively to what extent the type of passion is determined by preceding forms of internalization. Long-term longitudinal studies about the preceding predictors of passion are for example needed for tests of the hypothesis that personality traits prospectively predict the individual probability to develop a passion (see Moeller, Keiner, et al., in prep.). Further investigation is also needed in regard to the questionable long-term development of harmonious and obsessive passion. Can an individuals' predominant type of passion change over time? And if so, under which circumstances? These questions might be crucial for interventions aiming at the promotion of success and well-being in learning and performance contexts. Importantly, there is a need for testable models explaining the long-term development of passion, its predictors and outcomes. The current research is inconsistent: In different studies the same construct (e.g. flow) figures as predictor of passion (Fredricks et al., 2010), correlate of passion (Vallerand et al., 2003), or essential component of passion (Fredricks et al., 2010). Maybe iterative process models such as dynamic systems approaches (e.g. Lichtwarck-Aschoff, Kunnen, & van Geert, 2009) could explain how a construct such as flow can be both antecedent and result of an individuals' passionate inclination towards an activity, and how such experience might reinforce each other in iterative cycles. Currently, there is no such theoretical model. The

specification and empirical testing of process models is a task for the future research to complete.

### **Person-Oriented Analyses: General Degree Versus Specific Types of Passion**

The psychological literature about passion has often stated assumptions about differences between homogeneous subgroups of harmoniously and obsessively passionate individuals. In line with this assumption, numerous variable-centered studies have shown differences between the scales for harmonious and obsessive passion. However, the frequent assumption that individuals are either harmoniously or obsessively passionate (e.g. Vallerand et al., 2003) has been challenged by the results of several cluster analyses, which did not find any group of predominantly harmoniously or obsessively passionate individuals, but instead groups of individuals with throughout high, or low, scores in all measures and types of passion. These findings together with the often moderate to high correlation between the two types of passion (Séguin-Lévesque et al., 2003; Vallerand et al., 2006; Vallerand et al., 2003; Vallerand, Ntoumanis et al., 2008) motivate the question to what extent the measurable differences between the subscales for harmonious and obsessive passion concern the experiences of really existing individuals, and whether these are different types of passion or rather two distinct but coinciding aspects of the experience of passion. The cluster analyses reported in this thesis indicate that the general degree of passion accounts for group differences and we conclude that future studies should shed more light on the so far neglected difference between high and low passion. A useful framework for such studies would be the distinction between variable-oriented approaches and person-oriented approaches (Bergmann & Magnusson, 1997). For the questions whether there are genuinely harmoniously and obsessively passionate individuals and whether having a harmonious versus obsessive passion makes a difference, it seems more adequate to analyze the existence of homogeneous subgroups of individuals and the person-specific development (=person-oriented approach),

instead of the previous praxis to formulate and test hypothesis concerning the relations between variables (=variable-oriented approach).

### **Plead for a Larger Variety of Research Methods and More Objective Measures**

In most studies, passion and its hypothesized predictors, correlates and outcomes are assessed with self-report measures. This makes their results susceptible to response biases and other measurement errors. Some components of passion could be more validly assessed with objective measures: For example, the component ‘investment of time and resources’ of the dual model of passion could be tapped with behavioral measures or with the analyses of training schedules, behavioral observations, and reports by significant others

Furthermore, the passion component affect intensity, which is emphasized in the definitions of e.g. Moeller and Grassinger (2013) and Cardon, Wincent, et al. (2009) could be more validly assessed with in-the-moment measures such as the Experience Sampling Method or with psycho-physiological assessment of arousal such as electro-dermal resistance (EDR) or pupil dilatation. To assess the situation-specific experience of affect intensity with cross-situational self-report questionnaires is of limited validity, because the individuals have to retrospectively remember, evaluate and mentally aggregate their physical arousal across several situations in order to report a general value, which is complicated by the fact that physical arousal is not necessarily consciously aware. As Moeller, Dietrich, et al. (in prep.) have pointed out, passion can be operationalized at different levels of abstraction: as manifest passion of a person towards a particular activity, as the number of activities the person experiences such a manifest passion for, or as the frequency of situations in which an individual feels passionate about the activity at hand (e.g. feeling committed and desiring). It can be assumed that some research findings will differ in dependence of the considered level of abstraction, and not all levels of abstraction might be equally appropriate for the investigation of each research question. Future studies should investigate whether the

assumptions and previous findings hold true for more objective measures, all levels of abstraction, and also under experimentally controlled conditions.

### **Representative Sampling Should Include Drop-Outs Analyses**

Finally, as Sternberg once put it: “we need the lives of those who did not make it.” (Ericsson, Krampe, & Heizmann, 1993, p. 243). Many samples in studies on passion are pre-selected. The most unmotivated and unsuccessful individuals have dropped out long before instrumental music or dance students or adolescent soccer players are studied. This limits the generalizability of findings, and this is grave because the reasons for the drop-out can be assumed to be closely related to the relevant phenomena of motivation, practice, and performance. More representative and unselected samples or control groups should be included in future studies.

The motto of the Olympic summer games 2016 in Rio de Janeiro illustrates that psychologists are not the only ones to believe that passion is an important aspect of motivation, practice and achievement. If this notion holds true, however, is to be found out in the future research.

# Appendix

## **Appendix A. The Applied Scales**

### **Overview about the applied scales**

All scales applied in the studies of this thesis are documented in the following. They are reported in the language and with the instruction which they were applied with in the studies of this thesis. For scales that were applied in multiple studies, only one instruction is reported. The following table gives an overview about the applied scales, the applied language versions, item numbers, the studies they were applied in, the corresponding references, and the translators.



Table 45

*Overview about the scales applied in this thesis*

<b>Scale</b>	<b>Language</b>	<b>Item number</b>	<b>Used in which studies of this thesis?</b>	<b>Developed by ... (reference for the original version of the scale)</b>	<b>Eventually: Translation into the present language by...</b>
a) Com.pass scale, preliminary item set with reference to General Favourite Activities	German	21	Paper 2: study 1; Paper 3: study 5	Moeller & Grassinger, in prep.	Julia Moeller and Robert Grassinger,
b) Com.pass scale, final item set with reference to the activity soccer	German	31	Paper 2: study 3	Moeller & Grassinger, in prep.	Julia Moeller and Robert Grassinger,
c) Com.pass scale	Portuguese	21+10 <sub>(new items)</sub>	Paper 2: study 3; Paper 3: study 4	Moeller & Grassinger, in prep.	Julia Moeller with help of Atademes Branco Pereira and Marina Pickler Rorato. The new items were translated by Julia Moeller with help of Andrea Diniz and Tobias Antunes de Amorim.
d) Dual Model Passion Scale, German version	German	18	Paper 2: all studies; Paper 3: all studies	Vallerand et al., 2003	Julia Moeller and Robert Grassinger
e) Dual Model Passion Scale, Portuguese version	Portuguese	18	Paper 2: study 3; Paper 3: study 4	Vallerand et al., 2003	Julia Moeller with help of Atademes Branco Pereira and Marina Pickler Rorato.
f) Declarative passion scale	German	1 + 9 'distractor items'	Paper 2: pre-study and study 1; Paper 3: study 1, 2	Moeller & Grassinger, in prep.	

g) Sport Commitment Scale	German	6	Paper 2: study 3; Paper 3: study 4	Original: Scanlan et al., 1993; 2003; Latest versions from Sousa, et al., 2007; 2008	The latest version of the scale from Sousa et al., 2008 was translated into German by Julia Moeller
h) Sport Commitment Scale	Portuguese	6	Paper 2: study 3; Paper 3: study 4	Scanlan et al., 1993; 2003	Sousa et al., 2007; Sousa et al., 2008
i) BIS / BAS Scale, German translation	German	11 <sub>(BIS)</sub> + 13 <sub>(BAS)</sub>	Paper 3: studies 1 to 4	Carver & White, 1994	Strobel, Beauducel, Debener & Brocke, 2001
j) Impulsive Sensation Seeking Scale (subscale from the Zuckerman-Kuhlman-Personality Questionnaire (ZKPQ-50-CC))	German	10	Paper 3: study 3	Aluja et al., 2006	The scale was translated with forth and back translation by psychology students (5 <sup>th</sup> semester) of the University of Erfurt and native English speakers during a seminar taught by the author.
k) Positive Negative Affect Schedule (PANAS)	German	20	Paper 3: study 4	Watson et al., 1988	Krohne et al., 1996
l) Affect Scale	German	16	Paper 3: study 5	Kessler & Staudinger, 2009	
m) State-Trait-Heiterkeits-Skala (State-Trait Cheerfulness Inventory, STHI-60-T)	German	60	Paper 2: study 1; Paper 3: study 5	Ruch et al., 1996; 1997	
n) Exercise Addiction Inventory	German	6	Paper 3: study 1 and 2	Terry et al., 2004	
o) Loss of control scale (subscale of the 'Internetsuchtskala' / 'Internet Addiction Scale')	German	4	Paper 3: study 3	Hahn & Jerusalem, 2010	
p) Deliberate Practice Items	German	4	Paper 2: study 3	Charness, et al., 2005	Julia Moeller
q) Soccer Performance Indicators	German	7	Paper 2: study 3	Moeller, Keiner et al., in prep.	















### 6. The Declarative Passion Scale

Welche der folgenden Beschreibungen treffen auf die wichtigste Aktivität in Deinem Leben zu, die Du oben bei „Nr. 1“ eingetragen hast?

Es können mehrere Beschreibungen zutreffen.

	<b>trifft zu</b>	<b>trifft nicht zu</b>
Hobby	<input type="checkbox"/>	<input type="checkbox"/>
Lebensaufgabe	<input type="checkbox"/>	<input type="checkbox"/>
Begeisterung	<input type="checkbox"/>	<input type="checkbox"/>
Leidenschaft	<input type="checkbox"/>	<input type="checkbox"/>
Vorliebe	<input type="checkbox"/>	<input type="checkbox"/>
Berufung	<input type="checkbox"/>	<input type="checkbox"/>
Herzensangelegenheit	<input type="checkbox"/>	<input type="checkbox"/>
Starkes Interesse	<input type="checkbox"/>	<input type="checkbox"/>
Liebe	<input type="checkbox"/>	<input type="checkbox"/>
Lieblingsbeschäftigung	<input type="checkbox"/>	<input type="checkbox"/>

### 7. The German Version of the Sport Commitment Scale

Alle der folgenden Fragen beziehen sich auf das „Fußballspielen“.

Bitte geben Sie an, inwieweit die folgenden Aussagen für Sie zutreffen.

Bitte kreuzen Sie an, inwieweit die folgenden Aussagen für Sie zutreffen!

Die Skala reicht von 1 (stimme überhaupt nicht zu) bis 5 (stimme sehr stark zu).

	1 Stimme über- haupt nicht zu	2	3	4	5 Stimme sehr stark zu
Ich bin stolz wenn ich anderen erzähle, dass ich Fußball spiele.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Dieses Jahr möchte ich weiterhin Fußball spielen.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Dieses Jahr habe ich mich dem Fußballspielen verschrieben.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Dieses Jahr werde ich alles tun, um weiterhin Fußball spielen zu können.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Es wäre sehr schwer für mich, dieses Jahr mit dem Fußballspielen aufzuhören.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Ich bin fest entschlossen, dieses Jahr weiterhin Fußball zu spielen.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

### 8. The Portuguese Version of the Sport Commitment Scale

Pense na sua atividade favorita a qual você atribuiu o “Número 1”.

Por favor, marque as respostas que descrevem melhor a sua relação com essa atividade.

	1- Discordo totalmente	2 Discordo	3 Indeciso	4 Concordo	5- Concordo totalmente
Tenho orgulho em dizer aos outros que pratico essa atividade.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Este ano quero continuar a praticar essa atividade.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Este ano estou empenhado em praticar essa atividade.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Este ano farei tudo para continuar a praticar essa atividade.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Seria duro para mim deixar de praticar essa atividade este ano.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Estou decidido a continuar a praticar essa atividade no próximo ano.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

## 9. The BIS/BAS scale

**Der folgende Fragebogen enthält eine Reihe von Feststellungen, mit denen man sich selbst beschreiben kann. Diese Feststellungen können genau auf Sie zutreffen, eher zutreffen, eher nicht oder gar nicht auf Sie zutreffen. Zur Beantwortung des Fragebogens setzen Sie ein Kreuz in das entsprechende Kästchen.**

Bitte beantworten Sie jede Feststellungen, auch wenn Sie einmal nicht sicher sind, welche Antwort für Sie zutrifft. Kreuzen Sie dann diejenige Antwort an, die noch am ehesten auf Sie zutrifft.

	1	2	3	4
	Trifft für mich gar nicht zu	Trifft für mich eher nicht zu	Trifft für mich eher zu	Trifft für mich genau zu
Eine eigene Familie ist die wichtigste Sache im Leben.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Sogar wenn mir etwas Schlimmes bevorsteht, bin ich selten nervös oder ängstlich.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Ich strenge mich besonders an, damit ich erreiche was ich möchte.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Wenn mir etwas gut gelingt, bleibe ich sehr gerne bei der Sache.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Ich bin immer bereit, etwas Neues zu versuchen, wenn ich denke, dass es Spaß machen wird.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Es ist wichtig für mich, wie ich gekleidet bin.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Wenn ich erreiche, was ich will, bin ich voller Energie und Spannung.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Kritik oder Beschimpfungen verletzen mich ziemlich stark.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Wenn ich etwas haben will, tue ich für gewöhnlich alles, um es zu bekommen.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Ich werde oft Dinge nur deshalb tun, weil sie Spaß machen könnten.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Es ist schwierig für mich, Zeit für solche Dinge wie Friseurbesuche zu finden.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Wenn ich eine Chance sehe, etwas Erwünschtes zu bekommen, versuche ich sofort mein Glück.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Ich bin ziemlich besorgt oder verstimmt, wenn ich glaube oder weiß, dass jemand wütend auf mich ist.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Wenn ich eine Gelegenheit für etwas sehe, was ich mag, bin ich sofort voller Spannung.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Ich handle oft so, wie es mir gerade in den Sinn kommt.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Wenn ich glaube, dass mir etwas Unangenehmes bevorsteht, bin ich gewöhnlich ziemlich unruhig.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Ich wundere mich oft über das menschliche Verhalten.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Wenn mir etwas Schönes passiert, berührt mich das sehr stark.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Ich bin besorgt, wenn ich glaube, dass ich eine wichtige Sache schlecht gemacht habe.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Ich brauche Abwechslung und neue Erfahrungen.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Verglichen mit meinen Freunden habe ich sehr wenig Ängste.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Ich fände es sehr aufregend, einen Wettbewerb zu gewinnen.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Ich habe Angst, Fehler zu machen.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

**10. The Impulsive Sensation Seeking Scale (subscale from the Zuckerman-Kuhlman-  
Personality Questionnaire (ZKPQ-50-CC))**

Auf den folgenden Seiten finden Sie eine Reihe von Aussagen, die Personen verwenden können, um sich selbst zu beschreiben. Bitte lesen Sie jede Aussage und entscheiden Sie, ob diese auf Sie zutrifft oder nicht. Kreuzen Sie dann Ihre Antwort in den Kästchen rechts neben den Fragen an.

Wenn Sie mit einer Aussage übereinstimmen oder denken, dass sie Sie beschreibt, dann kreuzen Sie bitte ‚richtig‘ an. Wenn Sie mit einer Aussage nicht übereinstimmen oder finden, dass die Beschreibung nicht zu Ihnen passt, kreuzen Sie bitte ‚falsch‘ an.

R = RICHTIG F = FALSCH

(Markieren Sie bitte den gewählten Buchstaben)

Beantworten Sie bitte jede Aussage mit ‚richtig‘ oder ‚falsch‘, auch wenn Sie nicht hundertprozentig sicher sind.

	Trifft zu	Trifft nicht zu
Ich handle oft impulsiv.	<input type="checkbox"/>	<input type="checkbox"/>
Ich würde gerne spontan verreisen, ohne die Reiseroute oder den Fahrplan genau festzulegen.	<input type="checkbox"/>	<input type="checkbox"/>
Ich gerate gerne in neue Situationen, in denen nicht abzusehen ist, wie sie ausgehen.	<input type="checkbox"/>	<input type="checkbox"/>
Manchmal tue ich gern Dinge, die mir ein bisschen Angst machen.	<input type="checkbox"/>	<input type="checkbox"/>
Ich werde alles einmal ausprobieren.	<input type="checkbox"/>	<input type="checkbox"/>
Ich wünsche mir ein Leben, welches mir erlaubt, viel unterwegs und auf Reisen zu sein, um viele Veränderungen und Aufregungen zu erleben.	<input type="checkbox"/>	<input type="checkbox"/>
Manchmal mache ich "verrückte " Sachen nur so zum Spaß.	<input type="checkbox"/>	<input type="checkbox"/>
Ich bevorzuge Freunde, die auf aufregende Weise unberechenbar sind.	<input type="checkbox"/>	<input type="checkbox"/>
Ich werde oft von neuen, aufregenden Sachen und Ideen so gebannt, dass ich an mögliche Komplikationen gar nicht denke.	<input type="checkbox"/>	<input type="checkbox"/>
Ich mag "wilde", hemmungslose Parties.	<input type="checkbox"/>	<input type="checkbox"/>

### 11. The Positive Negative Affect Scale (PANAS)

Bitte geben Sie an, wie sie sich im letzten Jahr meistens beim Fußballspielen gefühlt haben.  
Bitte kreuzen Sie an, inwieweit die folgenden Beschreibungen auf Ihre Gefühle beim  
Fußballspielen zutreffen!

Die Skala reicht von 1 (trifft gar nicht zu) bis 5 (trifft äußerst zu).

	1	2	3	4	5
	gar nicht	ein bisschen	einiger- maßen	erheblich	äußerst
aktiv	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
interessiert	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
freudig erregt	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
stark	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
angeregt	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
stolz	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
begeistert	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
wach	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
entschlossen	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
aufmerksam	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
bekümmert	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
verärgert	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
schuldig	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
erschrocken	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
feindselig	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
gereizt	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
beschämt	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
nervös	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
durcheinander	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
ängstlich	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

## 12. The Affect Scale from Kessler & Staudinger (2009)

Wie fühlen Sie sich normalerweise während Sie diese Aktivität ausüben?

Während der Beschäftigung mit dieser Aktivität fühle ich mich...	1 Überhaupt nicht	2	3	4	5 Sehr stark
in mir ruhend	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
verärgert	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
euphorisch	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
matt	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
ängstlich	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
gelassen	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
energieelos	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
freudig	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
entspannt	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
unruhig	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
träge	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
begeistert	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
besorgt	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
locker	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
erfreut	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
schlapp	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

### 13. The State-Trait-Heiterkeits-Inventar (STHI-60-T; State-Trait Cheerfulness

#### Inventory, trait version with 60 items)

## STHI-T <60>

Kennwort:       Alter:   Geschlecht:

Die folgenden Aussagen beziehen sich auf Ihre Stimmungen und Ansichten **im allgemeinen**. Versuchen Sie bitte anhand der folgenden Aussagen Ihre **üblichen** Verhaltensweisen und Einstellungen so gut wie möglich zu beschreiben, indem Sie eine von vier Antwortmöglichkeiten ankreuzen. Die vier Alternativen lauten:

- [1] ... trifft gar nicht zu
- [2] ... trifft eher nicht zu
- [3] ... trifft etwas zu
- [4] ... trifft sehr zu

#### Beispiel:

Ich bin ein aktiver Mensch. .... [1] [2] [3] [4]

Wenn diese Aussage Sie sehr treffend beschreibt - d.h. wenn Sie im allgemeinen ein aktiver Mensch sind - kreuzen Sie bitte [4] an. Trifft diese Aussage auf Sie dagegen überhaupt nicht zu, dann kreuzen Sie bitte [1] an.

Sollten Sie einmal Schwierigkeiten haben, zu einer Frage Ihre Antwort zu finden, kreuzen Sie bitte die am ehesten zutreffende an. Kreuzen Sie bitte zu jeder Aussage eine der vier Antwortmöglichkeiten an, und lassen Sie keine Frage aus.

- 
1. Auch schwierige Situationen gehe ich leichten Herzens an. .... [1] [2] [3] [4]
  2. Im Gespräch vermeide ich bewusst Übertreibungen, Ausschmückungen oder Doppeldeutigkeiten, da sie nichts zur Aussage beitragen. .... [1] [2] [3] [4]
  3. Meine Stimmung ist häufig nicht die beste. .... [1] [2] [3] [4]
  4. Ich tue selten etwas ohne vernünftigen Grund. .... [1] [2] [3] [4]
  5. Mein Alltag bietet mir oft Anlaß zum Lachen. .... [1] [2] [3] [4]
  6. Mir ist oft eher zum Weinen als zum Lachen zumute. .... [1] [2] [3] [4]
  7. Ich neige manchmal zur Oberflächlichkeit. .... [1] [2] [3] [4]
  8. Meine Mitmenschen haben häufig einen Grund, mich zu fragen, ob mir "eine Laus über die Leber gelaufen sei". .... [1] [2] [3] [4]
  9. Ich lächle häufig. .... [1] [2] [3] [4]
  10. Ich bin ein ernster Mensch. .... [1] [2] [3] [4]
  11. Die gute Laune anderer wirkt ansteckend auf mich. .... [1] [2] [3] [4]
  12. Das Leben gibt mir wenig Grund zum Lachen. .... [1] [2] [3] [4]
  13. Die kleinen Dinge des Alltags finde ich oft komisch und erheitend. .... [1] [2] [3] [4]
  14. Die meisten meiner Freunde sind eher ernst und nachdenklich. .... [1] [2] [3] [4]
  15. Es kann vorkommen, daß ich für längere Zeit in einer betäubten Stimmung bin. .... [1] [2] [3] [4]
  16. Ich bin auf größtmögliche Korrektheit bedacht. .... [1] [2] [3] [4]
  17. Ich gehe unbeschwert durchs Leben. .... [1] [2] [3] [4]
  18. Es gibt Tage, an denen ich mich innerlich leer fühle. .... [1] [2] [3] [4]

trifft gar nicht zu  
trifft eher nicht zu  
trifft etwas zu  
trifft sehr

Bis hierher **alle** Aussagen bearbeitet? Wenn ja, dann bitte wenden.

- trifft gar nicht.  
 trifft eher nicht.  
 trifft etwas zu  
 trifft sehr
19. Ich bin oft in heiterer Stimmung. .... [1] [2] [3] [4]
20. Auch wenn man leicht als "humorlos" gilt: die trivialen und kindischen Dinge, welche andere Leute erheitern, kann man nur ablehnen. .... [1] [2] [3] [4]
21. Oft bin ich in einer so trübsinnigen Stimmung, daß mir wirklich nicht zum Lachen zumute ist. .... [1] [2] [3] [4]
22. Ich neige dazu, weit im voraus zu planen und mir langfristige Ziele zu stecken. .... [1] [2] [3] [4]
23. Ich bin ein fröhlicher Typ. .... [1] [2] [3] [4]
24. Manche verdrießliche Umstände können mir die Laune für längere Zeit verderben. .... [1] [2] [3] [4]
25. Bei allem, was ich tue, bedenke ich stets die möglichen Folgen und vergleiche alle möglichen Vor- und Nachteile sorgfältig. .... [1] [2] [3] [4]
26. Auch ohne besonderen Anlaß bin ich häufig verstimmt. .... [1] [2] [3] [4]
27. Es fällt mir leicht, gute Laune zu verbreiten. .... [1] [2] [3] [4]
28. Ich bin ein eher trauriger Mensch. .... [1] [2] [3] [4]
29. Alltägliche Situationen nehme ich fast genauso wichtig wie außergewöhnliche Angelegenheiten. .... [1] [2] [3] [4]
30. Ich lache gerne und viel. .... [1] [2] [3] [4]
31. Einer meiner Grundsätze lautet: "Erst die Arbeit, dann das Vergnügen!" .... [1] [2] [3] [4]
32. Ich unterhalte meine Freunde gerne mit lustigen Geschichten. .... [1] [2] [3] [4]
33. Es gibt häufig Tage, an denen der Spruch "ich bin mit dem falschen Fuß aufgestanden" gut meine Gemütsverfassung beschreibt. .... [1] [2] [3] [4]
34. Lachen wirkt auf mich sehr ansteckend. .... [1] [2] [3] [4]
35. Ich habe oft schlechte Laune. .... [1] [2] [3] [4]
36. Im Kontakt mit anderen fällt mir immer wieder auf, daß ich viel gründlicher über verschiedene Sachen nachgedacht habe. .... [1] [2] [3] [4]
37. Meine "lieben" Mitmenschen geben mir oft Anlaß, verdrossen zu sein. .... [1] [2] [3] [4]
38. Ich bin ein lustiger Mensch. .... [1] [2] [3] [4]
39. Da Entscheidungen Konsequenzen nach sich ziehen, vermeide ich es, Angelegenheiten oberflächlich zu behandeln bzw. leichtfertige Entschlüsse zu fassen. .... [1] [2] [3] [4]
40. Ich habe die Erfahrung gemacht, daß an dem Sprichwort "Lachen ist die beste Medizin" wirklich etwas dran ist. .... [1] [2] [3] [4]
41. Ich versuche mich in meiner Freizeit möglichst sinnvoll zu beschäftigen. .... [1] [2] [3] [4]
42. Ich denke oft: "Mensch, laßt mich heute bloß in Ruhe!" .... [1] [2] [3] [4]
43. Auch scheinbare Kleinigkeiten bedürfen einer ernsthaften und verantwortungsvollen Behandlung. .... [1] [2] [3] [4]
44. Ich bin ein heiterer Mensch. .... [1] [2] [3] [4]
45. Beim Versuch, mich in heitere Stimmung zu versetzen, haben sich schon viele die Zähne ausgebissen. .... [1] [2] [3] [4]
46. Ich bin häufig in mißmutiger Stimmung. .... [1] [2] [3] [4]
47. Ich begeben mich nur ungern in die Gesellschaft von Leuten, die ständig herumlachen und ausgelassen-fröhlich sind. .... [1] [2] [3] [4]



trifft gar nicht  
trifft eher nicht  
trifft etwas zu  
trifft sehr

- 48. Ich bin leicht zum Lachen zu bringen. .... [ 1 ] [ 2 ] [ 3 ] [ 4 ]
- 49. Auch unter fröhlichen Menschen versuche ich eher, ein vernünftiges, sachliches Gespräch zu führen, als mich an den Späßen der anderen zu beteiligen. .... [ 1 ] [ 2 ] [ 3 ] [ 4 ]
- 50. Ich nehme die Dinge, wie sie kommen. .... [ 1 ] [ 2 ] [ 3 ] [ 4 ]
- 51. Verglichen mit anderen kann ich ganz schön mürrisch und griesgrämig werden. .... [ 1 ] [ 2 ] [ 3 ] [ 4 ]
- 52. Ich bin häufig in einer vernünftigen Stimmung. .... [ 1 ] [ 2 ] [ 3 ] [ 4 ]
- 53. Ich tue nur Dinge, die einen gewissen Sinn ergeben; alles andere ist unnütze Zeitverschwendung und zwecklos. .... [ 1 ] [ 2 ] [ 3 ] [ 4 ]
- 54. Ich bin manchmal auch ohne Grund ganz traurig. .... [ 1 ] [ 2 ] [ 3 ] [ 4 ]
- 55. Ich mag Menschen, die Überlegung und Sachlichkeit ausstrahlen. .... [ 1 ] [ 2 ] [ 3 ] [ 4 ]
- 56. Ich habe ein sonniges Gemüt. .... [ 1 ] [ 2 ] [ 3 ] [ 4 ]
- 57. Die Gegenwart anderer Menschen, die lustig und ausgelassen sind, kann mir ganz schön auf die Nerven gehen. .... [ 1 ] [ 2 ] [ 3 ] [ 4 ]
- 58. Im Kontakt mit anderen Menschen bin ich immer um einen sachlich-nüchternen Gedankenaustausch bemüht. .... [ 1 ] [ 2 ] [ 3 ] [ 4 ]
- 59. Ich bin häufig niedergeschlagen. .... [ 1 ] [ 2 ] [ 3 ] [ 4 ]
- 60. Die kleinen Mißgeschicke des Alltags finde ich oft amüsant, selbst wenn sie mich betreffen. .... [ 1 ] [ 2 ] [ 3 ] [ 4 ]

Bitte überprüfen Sie abschließend noch einmal, ob Sie **alle** Aussagen bearbeitet haben.

Beantworten Sie bitte noch folgende demographische Fragen, indem Sie das Zutreffende ankreuzen:

**Schulabschluss**

- vor der letzten Hauptschulklasse abgeschlossen ..... [ ]
- mit der letzten Hauptschulklasse abgeschlossen ..... [ ]
- Real- (Mittel-) oder Handelsschule ohne Abschlussprüfung . [ ]
- Real- (Mittel-) oder Handelsschule mit Abschlussprüfung .. [ ]
- Gymnasium (Höhere Schule) ohne Abitur ..... [ ]
- Abitur ohne anschließendes Studium ..... [ ]
- Abitur mit nicht abgeschlossenem Studium ..... [ ]
- Abitur mit abgeschlossenem Studium ..... [ ]

**Familienstand**

- ledig ..... [ ]
- verheiratet ..... [ ]
- verwitwet ..... [ ]
- geschieden/getrennt ..... [ ]

**Haushalt**

- allein lebend ..... [ ]
- zusammenlebend mit Ehepartner(in)/Lebenspartner(in)/Familie ..... [ ]

**Tätigkeit**

- berufstätig ..... [ ]
- mithelfend im eigenen Betrieb ..... [ ]
- Hausfrau/Hausmann ..... [ ]
- Schüler(in) ..... [ ]
- Student(in) ..... [ ]
- in Berufsausbildung ..... [ ]
- Rentner(in)/im Ruhestand ..... [ ]
- arbeitslos ..... [ ]
- ohne Beruf ..... [ ]

**Berufsgruppe**

- Bitte den gegenwärtig ausgeübten Beruf ankreuzen.
- Inhaber(in) und Geschäftsführer(in) von größeren Unternehmen ..... [ ]
- Freier Beruf ..... [ ]
- Mittlere und kleinere selbständige Geschäftsleute ..... [ ]
- Selbständige(r) Handwerker(in) ..... [ ]
- Leitende(r) Angestellte(r) ..... [ ]
- Nichtleitende(r) Angestellte(r) ..... [ ]
- Beamter(in) des höheren oder gehobenen Dienstes ..... [ ]
- Beamter(in) des mittleren oder einfachen Dienstes ..... [ ]
- Landwirt(in) ..... [ ]
- Facharbeiter(in) mit abgelegter Prüfung ..... [ ]
- Sonstige(r) Arbeiter(in) ..... [ ]

**Einwohnerzahl der Wohngemeinde**

- bis 2.000 ..... [ ]
- bis 20.000 ..... [ ]
- bis 100.000 ..... [ ]
- über 100.000 ..... [ ]

**Hobbys und Freizeitinteressen**

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

### 14. The Exercise Addiction Inventory (EAI)

Bitte kreuzen Sie an, welche Antworten auf diese Aktivität zutreffen!

	1	2	3	4	5
	Stimme überhaupt nicht zu		Teils/teils		Stimme vollkommen zu
Trainieren ist das Wichtigste in meinem Leben	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Zwischen mir und meiner Familie und/oder meinem Partner sind Konflikte aufgrund meines Trainingspensums entstanden.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Trainieren hilft mir meine Stimmung zu heben, mich anders zu fühlen, mich für etwas zu begeistern oder dem Alltag zu entfliehen.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Im Laufe der Zeit habe ich mein Trainingspensum pro Tag erhöht.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Wenn ich eine Trainingsstunde versäume, bin ich schlecht gelaunt und reizbar.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Wenn ich mein Trainingspensum reduziere und wieder von Neuem beginne, trainiere ich binnen kürzester Zeit wieder genauso viel wie vorher.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

**15. The Loss of control scale (subscale of the ‘Internetsuchtskala’/ ‘Internet Addiction Scale’)**

Bitte wählen Sie aus, was auf Sie zutrifft!

	<b>Trifft zu</b>	<b>Trifft nicht zu</b>
Ich verbringe oft mehr Zeit mit Pokern, als ich mir vorgenommen habe	<input type="checkbox"/>	<input type="checkbox"/>
Ich habe schon häufiger vergeblich versucht, meine Zeit beim Pokern zu reduzieren.	<input type="checkbox"/>	<input type="checkbox"/>
Ich gebe mehr Geld für das Pokern aus als ich mir eigentlich leisten kann.	<input type="checkbox"/>	<input type="checkbox"/>
Beim Pokern ertappe ich mich häufig dabei, dass ich sage: Nur noch ein paar Minuten, und dann kann ich doch nicht aufhören.	<input type="checkbox"/>	<input type="checkbox"/>

**16. Items for the Assessment of Deliberate Practice in Soccer**

**Wie viel Zeit verbringen Sie normalerweise in einer Woche mit dem Fußballspiel?**

- weniger als eine Stunde
- ein bis zwei Stunden
- mehr als zwei Stunden bis drei Stunden
- mehr als drei Stunden bis vier Stunden
- mehr als vier Stunden bis fünf Stunden
- mehr als fünf Stunden, nämlich so viele Stunden: \_\_\_\_\_ (bitte hier eintragen)

**Seit wie vielen Jahren spielen Sie Fußball? ,**

*Gemeint sind alle Arten des Spiels*

seit ca. \_\_\_\_\_ Jahren

**Seit wie vielen Jahren trainieren Sie ernsthaft Fußball?**

*gemeint ist das Training mit Trainer und in der Absicht, besser zu werden*

seit ca. \_\_\_\_\_ Jahren

**Wie viele Jahre haben Sie insgesamt im Verein Fußball gespielt?**

seit ca. \_\_\_\_\_ Jahren



Bitte kreuzen Sie hier an, in welcher Spielposition Sie meistens spielen!

---

<input type="radio"/> Torwart	<input type="radio"/> Innenverteidiger	<input type="radio"/> linkes Mittelfeld
<input type="radio"/> Vorstopper	<input type="radio"/> rechter Verteidiger	<input type="radio"/> rechtes Mittelfeld
<input type="radio"/> Libero	<input type="radio"/> linker Verteidiger	<input type="radio"/> offensives Mittelfeld
<input type="radio"/> linker Stürmer	<input type="radio"/> Mittelstürmer	<input type="radio"/> defensives Mittelfeld

## Appendix B. The Instructions for the Applied Scales

### 1. German Instruction for the Survey Among University Students (Refers to the Individuals' Favorite Activities)

Liebe Studentin, lieber Student,

wir freuen uns, dass Sie an unserer Untersuchung teilnehmen wollen. Ihre Teilnahme ist freiwillig. Wenn Sie nicht teilnehmen, hat das keine negativen Auswirkungen. Die Befragung ist anonym. Wenn Sie den Fragebogen abgegeben haben, wird niemand mehr wissen, wer genau ihn ausgefüllt hat.

Wir bitten Sie, unsere Aufgaben gründlich und in Ruhe zu bearbeiten. Bitte bearbeiten Sie die Fragen alleine und tauschen Sie sich nicht mit Ihrem Nachbarn aus. Dieser Fragebogen dreht sich um Ihre Lieblingsaktivität. Bei den meisten Fragen ist die zutreffende Antwort anzukreuzen. Bitte geben Sie die Antworten an, die am besten auf Sie zutreffen. Sollten Sie Fragen haben, wenden Sie sich bitte an uns!

Viel Spaß!

Denken Sie jetzt bitte an die Aktivitäten, die für Sie in Ihrem Leben am wichtigsten sind, und schreiben Sie diese auf! Wir meinen Ihre Lieblingsbeschäftigungen (z.B. Fußballspielen, Lesen, Computerspielen, Tanzen). Nicht gemeint sind Aktivitäten wie „Atmen“ oder „Essen“. Bitte listen Sie hier Ihre 3 wichtigsten Lieblingsaktivitäten auf! Schreiben Sie nur eine einzige Aktivität auf jede Zeile. Beschreiben Sie den Tätigkeitscharakter so genau wie möglich (z.B. „Handball spielen“ statt allgemein „Handball“)

	Nr. <input style="width: 40px; height: 20px;" type="text"/>
	Nr. <input style="width: 40px; height: 20px;" type="text"/>
	Nr. <input style="width: 40px; height: 20px;" type="text"/>

Bitte ordnen Sie diese 3 Aktivitäten nun nach ihrer Wichtigkeit für Sie. Geben Sie Ihrer liebsten Aktivität die Nummer 1, der zweitliebsten die Nummer 2 und der drittliebsten die Nummer 3.

Bitte entscheiden Sie sich unbedingt für eine Nummer je Aktivität und vergeben Sie keine Nummer zweimal.

Alle folgenden Fragen beziehen sich auf Ihre wichtigste Lieblingsaktivität, welche Sie unter „Nr. 1“ eingetragen haben.

Denken Sie an Ihre wichtigste Lieblingsaktivität, die Sie auf der ersten Seite unter „Nr. 1“ eingetragen haben!

Bitte kreuzen Sie an, welche Antworten auf diese Aktivität zutreffen!

## 2. Portuguese Instruction for the Survey Among Secondary School Students in Rio de Janeiro, Brazil (Refers to the Individuals' Favorite Activity)

Prezado(a) Aluno(a),

Agradecemos sua participação em nossa pesquisa. Essa pesquisa tem por objetivo embasar estudos para a elaboração de uma tese de doutorado a ser apresentada na Universidade de Erfurt, na Alemanha, na área de psicologia.

Sua participação é voluntária, assim você não está de forma alguma obrigado a colaborar com a pesquisa. Caso não queira colaborar, apenas devolva esse formulário em branco. Sua participação é anônima e, portanto, não será possível relacionar esta pesquisa individualmente a você ou aos seus dados pessoais.

Pedimos que responda as questões com atenção. Por favor, responda todas as perguntas com sinceridade e sozinho. É muito importante que você responda todas as perguntas, ainda que algumas sejam similares.

Este questionário trata da sua atividade favorita. Assinale a resposta apropriada a cada questão marcando a que melhor reflete a sua opinião. O preenchimento de todas as repostas levará, no máximo, quinze minutos. Se você tiver alguma dúvida, entre em contato!

Obrigada!

Julia Moeller,  
Dipl.-Psych.

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Por favor pense nas atividades que são mais importantes para você em sua vida! Pense nas suas atividades favoritas como, por exemplo, jogar futebol, ler, jogar vídeo-games, dançar. Não considere atividades como "respirar" ou "alimentar-se". Agora, liste suas três atividades preferidas nos espaços abaixo! Escreva apenas uma atividade em cada linha. Descreva a natureza da atividade com maior precisão possível (por exemplo, "jogar futebol" ou "assistir jogos de futebol" em vez de somente "futebol").

\_\_\_\_\_ N°.

\_\_\_\_\_ N°.

\_\_\_\_\_ N°.

Classifique essas 3 atividades em ordem de importância para você. Dê a sua atividade favorita o número 1. Para a atividade de segunda importância dê o número 2 e para a atividade de terceira importância o número 3. Anote os números correspondentes a cada atividade no quadrado diante da respectiva atividade acima. Por favor, atribua apenas um número para cada atividade e não repita nenhum número.



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### **Information About the Contribution of Other People to This Thesis**

I wrote the first manuscripts to all four papers included in this thesis, and I was the one who realized most of the changes in these manuscripts. However, this work was influenced, advised, prove-read and commented by several colleagues. They and their contribution to this thesis are named in the following.

**Professor Dr. Ernst Hany** is full professor at the University of Erfurt, Germany and the advisor of this thesis. He gave feedback on the planning of the data collections reported in paper one and two and to all manuscripts during and after the process of writing.

**Dr. Robert Grassinger** is post-doc researcher and teaching and research staff at the University of Augsburg, Germany. He is co-author in the papers one and two. The literature review of paper 1 is the result of constantly ongoing discussions between Robert Grassinger and me over the last three years, and the result of a number of feedback and comment loops between Dr. Grassinger and myself. We both have contributed equally to the literature review. The second paper has been solely written by myself, but it has been prove-read and commented on by Robert Grassinger.

**Dr. Julia Dietrich**, is post-doc researcher and teaching and research staff at the University of Jena, Germany. She is second author of paper four and has provided ideas and advice concerning the statistical analysis of the data of study four. I conducted the analyses myself but discussed the results and further strategies regularly with Dr. Dietrich. Dr. Dietrich has also prove-read and commented the papers four and paper one.

**Professor Jacquelynne S. Eccles** is full professor at the University of Michigan, U.S.A. She is co-author of paper four. Professor Eccles has supported this thesis by commenting and prove-reading the manuscript of paper four, by putting me in contact to Professor Schneider, and by pointing out that the Sloan study included relevant data for my research questions. Very helpful for this thesis was also Professor Eccles' invitation to visit



her lab at the University of Michigan. This visit has helped me to get into contact with other colleagues mentioned below (Prof. Schneider and Fani Lauermann), and it has helped me to find and discuss relevant literature that I processed in the literature review (paper one). The encouragement by Professor Eccles was decisive for my decision to write paper one.

**Professor Barbara Schneider** is full professor at the Michigan State University, U.S.A. She has supported this thesis by providing the data and her advice to the fourth paper and by commenting on the corresponding manuscript.

**Melanie Keiner, B.A.** is currently master student at the University of Erfurt, Germany, and worked with me for her bachelor's thesis in the study about the Thuringian soccer player (this is study three in paper two and study four in paper three). She contributed to this thesis by her participation in the study planning, the preparation of questionnaires and other materials, her participation in the data collection and her helpful literature tips. She also was one of the students who participated in the planning and data collection of study three in paper three (the sample of leisure poker players).

**Denise Wächter, B.A.** is currently master student at the University of Erfurt, Germany. She also wrote her bachelor's thesis about passion for soccer, thus contributing to the planning, preparation, and realization of this study (study three in paper two and study four in paper three). She also contributed to paper three as one of the students involved in the planning and data collection.

Additional to the above mentioned co-authors, the following colleagues have supported my work with their comments and literature tips.

*Thomas Münzberg* and *Dieter Lippold* from the Thuringian Soccer Association (TFV), have enabled me to collect the data among Thuringian soccer players by providing the contacts to the soccer coaches. They also gave advice concerning the question which items

would be most useful for the assessment of soccer performance among adolescent soccer players.

The data collections of the first, second and third studies of paper three have been planned and realized during a bachelor course seminar at the University of Erfurt in Winter 2011 /2012. The following students were involved in the planning, preparation, and data collection of these studies: *Katharina Grün, Anna Sophie Hahne, Anna Kalitzki, Melanie Keiner, Jan Kotzerke, Klara Mathison, Miriam Mellentin, Viktoria Schwanke, Nils Sagolla, Denise Wächter, and Isabell Weiher.*

*Fani Lauermann, Ph.D.* from the University of Michigan, U.S.A. has proof-read the final version of paper one.

*Sointu Leikas, Ph.D.* from the University of Helsinki, Finland, has proof-read and commented the final version of paper three.

The data collection in Rio de Janeiro, Brazil (study two of paper two) was made possible by the help of *Atademes Branco Pereira (bacharel em direito, Bel.), Marina Pickler Rorato (M.P.P.), Andréa C. Diniz (Bel.), and Tobias A. de Amorim (Ms.C.),* who helped with the translation of the questionnaires. The data collection in the schools was made possible by *Atademes Branco Pereira and Montgomery Miranda (Bel.).*

### **Ehrenwörtliche Erklärung**

Ich erkläre hiermit ehrenwörtlich, dass ich die vorliegende Arbeit ohne unzulässige Hilfe Dritter und ohne Benutzung anderer als der angegebenen Hilfsmittel angefertigt habe; die aus fremden Quellen direkt oder indirekt übernommenen Gedanken sind als solche kenntlich gemacht. Bei der Auswahl und Auswertung des Materials sowie bei der Herstellung des Manuskripts habe ich Unterstützungsleistung von folgenden Personen erhalten:

1. Prof. Dr. Ernst Hany
2. Prof. Dr. Niegemann
3. Prof. Dr. Jacquelynne S. Eccles

Alle weiteren Personen, die an der Arbeit beteiligt waren, und ihre Beiträge zu dieser Arbeit sind auf der voranstehenden Seite („Information About the Contribution of Other People to This Thesis“) benannt. Darüber hinaus waren keine weiteren Personen an der geistigen Herstellung der vorliegenden Arbeit beteiligt. Insbesondere habe ich nicht die Hilfe eines Promotionsberaters

in Anspruch genommen. Dritte haben von mir weder unmittelbar noch mittelbar geldwerte Leistungen für Arbeiten erhalten, die im Zusammenhang mit dem Inhalt der vorgelegten Dissertation stehen.

Die Arbeit oder Teile davon wurden bisher weder im Inland noch im Ausland in gleicher oder ähnlicher Form einer anderen Prüfungsbehörde als Dissertation vorgelegt. Ferner erkläre ich, dass ich nicht bereits eine gleichartige Doktorprüfung an einer Hochschule endgültig bestanden habe.

## Curriculum Vitae

### *Academic Education*

Since 2013	Post-doctoral researcher at the University of Helsinki
Since 2010	Doctoral student at the chair for Pedagogical-Psychological Diagnostic and Differential Psychology (Prof. Dr. Ernst Hany), University of Erfurt (Germany). Dissertation topic: Passion as a construct of motivational psychology.
Since 2010	Fellow in the Center for Empirical Research in Economics and Behavioral Sciences (CEREB), University of Erfurt.
2003 - 2008	Studies of Psychology at the Free University Berlin (Germany).
2008	Diploma thesis with the topic „Symptom Validity Assessment in the case of crime-related amnesia using event-related potentials“.
2006 - 2007	ERASMUS-Exchange semester at the University of Barcelona, Spain.
2006	Internship (700 h) at the University Clinic Charité Berlin, Clinic for Psychiatry, Psychotherapy und Psychosomatic for childhood and adolescence. Main tasks: Psychological test assessments.
2003	Abitur (university entrance diploma)

### *Work Experience*

09/2013-ongoing Research staff:	Research staff in the EAGER project. Project managers: Prof. Katarina Salmela-Aro, Prof. Jari Lavonen and Prof. Barbara Schneider
Since 09/2010: Research & teaching staff:	Research and teaching staff and doctoral student at the University of Erfurt, Chair of Differential Psychology and educational Assessment (Prof. Dr. Ernst Hany).
04/2011-03/2012: Research staff:	Scientific Officer in research project on gender-fair assessment of vocational interests, project ‘EIGELB‘. Project manager: Prof. Dr. Ernst Hany.
02/2009-08/2010: Research staff:	Scientific officer in the project ‘Gifts Up’ (evaluation of ideational support in the German scholarship system). University of Erfurt, Chair of Differential Psychology and educational Assessment. Project manager: Professor Dr. E. Hany).
10/2008-01/2009: Research Internship:	Research internship in the Institute for forensic psychiatry, Charité Campus Benjamin Franklin, Berlin (project: ‘CRIME-III’, evaluation of prognosis of recidivism for juvenile offenders).
2007: Student assistant:	Student assistant for psychological screening assessment in a geriatric hospital (Dominikuskrankenhaus, Charité Berlin).

*Teaching Experience at the University of Erfurt*

Summer 2013, 2012, 2011	Undergraduate Seminar, topic: Personality, Learning, Performance
Winter 2012/2013 and Winter 2013/2014	Undergraduate Seminar, topic: Diagnostics: Testing and deciding.
Winter 2012/2013	Workshop for doctoral students “R for beginners” (Erfurt Graduate School)
Winter 2011/2012	Empirical Practice Seminar, topic: Passion as a construct of motivation psychology
Winter 2011/2012	Graduate Seminar, topic: Development, Implementation and Evaluation of diagnostical instruments (together with Prof. Dr. E. Hany).
Summer 2009	Undergraduate Project seminar: Qualitative Methods in studies on gifted education in the tertiary sector in Germany (together with Christiane Grosch).

*Invited Lectures within Gifted Education programs*

2012:	Workshop on intelligence measurement, held at the summer academy of the Cusanuswerk (gifted education program of the Catholic Church in Germany), 24 <sup>th</sup> -27 <sup>th</sup> July 2012, Münster, Germany.
2011:	Workshop on the topic „ <i>Passion as non-substance related enhancement</i> “, held at the summer academy of the Cusanuswerk (gifted education program of the Catholic Church in Germany), 19 <sup>th</sup> -23 <sup>th</sup> September 2011, Papenburg, Germany.

*Grants and awards*

Since September 2013	Postdoctoral fellow im Forschungsnetzwerk „Pathways to Adulthood“ ( <a href="http://www.pathwaystoadulthood.org/">http://www.pathwaystoadulthood.org/</a> ).
August 2011	Scholarship of the DAAD (German Academic Exchange Service) for a research visit at the University of Michigan, USA (invited by Professor Jacquelynne Eccles)
2010	I was offered doctoral scholarship from the Center for Empirical Research in Economics and Behavioral Sciences (CEREB), University of Erfurt, but could not accept because I decided in favor of a contract as research & teaching staff, see above.
2006-2008	Scholarship for high achieving students of the foundation Hans-Böckler-Stiftung.

“Our passions are real phoenixes.

As the old one burns away, the new one immediately rises from its ashes.”

(Goethe, 1809/1981, p. 385).