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Trust in the coach - athlete relationship through digital communication

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Summary

The internet, social media, technological advancements, apps and wearables have changes the ways coach and athlete interact: The new technologies offer opportunities for coach and athlete to interact, communicate and work together despite being geographically separated. The technologies allow more and more athletes access to expert coaching. However, little is known this far about how these new forms of communication affect the development of trust within this relationship. As prior research indicates that trust is essential within the coach-athlete relationship, the current thesis examines how trust within the coach-athlete relationship is built through digital communication. Based on prior research of the coach-athlete relationship, trust research and trust in technology research, a model is developed, incorporating different technology roles (trustee role, and mediator role), and explaining how interpersonal trust is affected by digital communication. In three studies, different aspects of the model are tested. The first study tests the mediator role of technology, examining how the trustworthiness of coach is perceived through digital communication. In an experimental design the development of trust is examined, indicating that a coach's ability and integrity are not perceived differently through digital or face to face communication. The second study examines technology in the trustee role, examining a model of trust in technology. The study implements structural equation modelling and thus validates a model of trust in technology for the context of exercise technologies. The results show that the antecedents functionality, reliability and help-function reliably and validly explain trusting beliefs in a specific technology, while institution based trust and general propensity to trust technology make up initial trust in an exercise technology. The third study finally examined the interaction of both trust in technology, as well as trust in coach, examining trust-transfer effects. Implementing a vignette design, the final study shows that negative trust transfer can occur from technology to coach: Specifically, the research indicates that when a technology is perceived as dysfunctional, unreliable or un-helpful, coach is also perceived as less able, benevolent or integer. Taken together, the current dissertation suggests that digital communication can be implement within the coach-athlete relationship, if the technology is trustworthy. If the technology is not trustworthy, negative effects on the trust in coach are likely to occur.

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I. Theoretical and Empirical Background

1. Introduction

“I would often call Holger [my coach] and ask him for his advice. Sometimes I was on the verge of giving up. But just as he preached right from the start that sports can't be everything in life, he also taught me to make my own decisions and stand behind them. In a situation like that, it's very helpful to be able to trust someone with lots of experience.” (Gilbert, 2012). In this quote, former NBA star Dirk Nowitzky talks about his first coach and mentor, Holger Geschwinder. It is one of many times, that he has stated throughout his career, that his coach was very important to his personal, as well as athletic development. He also states the importance of trusting his coach and being able to rely on him. Dirk Nowitzky and Holger Geschwinder are but one example of such a special bond between athlete and coach. Several other striking examples come to mind in recent sporting history: Both boxing legends Vladimir and Vitali Klitschko describe their longtime coach Fritz Sdunek as a huge influence on their professional and personal development, as well as a close friend. Similarly, current British bouldering star Shauna Coxsey ascribes her world dominating form to a close working relationship with her coach and has stated in interviews, that she trusts her coach blindly (IfSC, 2015).

These quotes show that athletes have an intuitive understanding of the importance of trust within the coach-athlete relationship. The athletes describe how they rely on their coach and that they believe their coach will treat them well and further their athletic career. When Shauna Coxsey describes “blindly trusting her coach” (IFSC, 2015), she is putting herself in a situation, wherein her coach could harm her. Yet she states she trusts he will not do so. Besides emphasizing the importance of trust, the described relationships are anecdotal indications of what sport psychological research has found: Overall, research agrees that the coach-athlete relationship is one of the most important relationships in an athlete’s life, crucial to the achievement of athletic success, increased well-being, as well as personality development, and influential beyond the athletic realm (e.g. Chelladurai, 1990; Jowett, 2007; Smith, Smoll, & Cumming, 2007). All aspects of coach's work depend upon a good relationship (Jowett, & Cockerill, 2002). This good relationship, oftentimes, is built upon mutual trust and good communication between coach and athlete.

It is crucial for coach and athlete to trust each other. This is shown anecdotally through the initial examples but has also been found by research: Mutual trust is beneficial to the overall relationship quality, athletic success and athlete well-being (Jowett, 2007; Padberg, 2006; Zhang & Chelladurai, 2013). Trust within the coach-athlete relationship is built through good communication and mutual interactions. The communication between coach and athlete is

important, not only for the development of trust, but for the development of the relationship in general: It bridges the gap and allows coaches to communicate their ability, benevolence, integrity, as well as technical and tactical knowledge (Borggrefe, & Cachay, 2015). Therefore, good communication is essential for coach and athlete to work together.

The way in which coach and athlete communicate is changing, as emerging technologies offer new ways for coach and athlete to connect: While once traditional face to face communication or communication via phone call was the only viable way for coach and athlete to interact in a meaningful way, messaging services, training-platforms, apps and wearables now offer a wide range of new, digital communication forms. A survey among German athletes revealed that e-mail was the second most used form of communication, behind face to face communication with coach (Merz, & Thiel, 2014). This new form of communication offers many advantages and opportunities for the coach-athlete interaction: The technologies enable coaches and athletes to stay connected, across great distances. The digital communication channels allow athletes access to expert coaching, despite geographical dispersion.

Besides this, the new technologies allow coaches and athletes new ways to track and monitor performance: Apps and wearables allow athletes to track and monitor their athletic progress, e.g. by monitoring heart-rate and using GPS during endurance performances. In this way, coach can objectively monitor and control, whether an athlete is fulfilling their athletic goals. The new technologies even allow coach and athlete to monitor, communicate and adjust endurance training live during the training session, regardless of where coach and athlete are. One striking example of this can be found in successful Ironman triathlete Jan Frodeno, who is the first ever triathlete to win both the Olympic gold medal, as well as the Ironman on Hawaii. Reportedly, he is monitored live, yet digitally by his coach during his endurance sessions: While Frodeno trains at home in Spain, his coach can monitor him from Germany. Thus, Frodeno can receive feedback on how best to improve immediately after or even still during training (Johnson, 2016). In this way, the technology connects coach and athlete, despite being separated. Additionally, the technology thus allows large amounts of objective training parameters to be communicated easily and effectively.

While these advantages of new, digital communication are apparent, research has yet to examine these forms of communication and their impact on the coach-athlete relationship. The question remains unanswered, whether a lack of face to face communication, less personal communication, or the constant monitoring and control that accompany these technologies have detrimental effects on the important interpersonal relationship between coach and athlete. For example, the control and monitoring through apps and wearables on the one hand, might be

seen by athletes as additional effort and care on the side of coaches and therefore might be beneficial to the relationship. On the other hand, the control mechanisms implemented might be seen as a form of control, over trust, as some researchers see these two as diametrically opposed: Sitkin and George (2005) postulate that control mechanisms are aimed at reducing perceived risk, while also reducing the need for trust. If athletes perceive the monitoring through coaches as a form of control due to lack of trust, the consequence would be detrimental to the overall coach-athlete relationship

Research has yet to examine the influence digital communication has on the development of trust within the coach-athlete relationship. The current thesis presented here aims at addressing this gap in the research. It tries to answer the question of how trust in coach is affected through new, emerging technologies. As these new digital technologies are already being implemented, it will be important to understand how they affect the development of trust, in order to adapt and manage trust building strategies within the coach athlete relationship.

In order to examine how trust is built within this important relationship through digital communication, it will be necessary to carefully examine research within the field of online trust. Research on online trust postulates that it is by far more complex than interpersonal trust in traditional face-to-face situations, as multiple trusting relationships co-exist: i.e. trust in the internet, trust in a communication partner, as well as trust in a digital communication technology must all be considered alongside each other (Beldad, de Jong, & Steethouder, 2010; Söllner, Hoffmann, & Leimeister, 2016). Therefore, the current thesis will not only examine interpersonal trust within the coach-athlete relationship, but also examine the concepts of trust in technology, as well as how interpersonal trust and trust in technology interplay with each other. The goal will be to examine how interpersonal trust within the coach-athlete relationship is affected through digital communication, and which role trust in technology plays within this context.

The present thesis was conducted within the context of the research training group “Trust and Communication in a Digitized World” at the University of Münster, Germany and was funded by the German Research Foundation (DFG). This research training group addresses research questions around the topics of trust, communication and digitization from an interdisciplinary perspective, thus incorporating research from communication sciences, information sciences, psychology, sport sciences and management and economics. The current work approaches the subject of trust and digital communication from a psychological and sport science perspective, examining the various topics of trust, communication and digitization within the context of the coach athlete relationship. By bringing the constructs of trust, coach-

athlete relationship and digital communication together, the current research proposes a new model of how trust in the coach-athlete relationship is developed through digital communication. The goal of this model will be to address the research questions and examine how trust is affected through digital interactions. The model incorporates research on the coach-athlete relationship, together with models of interpersonal trust and trust in technology. Using this new model as a starting point, specific research questions are derived and addressed over three separate studies.

Before starting with the theoretical background for the current research, the following short description offers an advanced organizer, guiding the reader through the structure of this work. In general, it can be divided into three sections, i.e. the theoretical background (Chapter 2-6), the empirical studies (Chapter 7-9), and a concluding discussing of the entire research conducted within this thesis (Chapter 10).

The theoretical background will start by addressing each of the relevant theoretical constructs individually, before bringing them together to derive the central research model and research questions. Starting with the coach-athlete relationship, theories and models of this relationship will be presented providing the work with a context for the entire research. A comprehensive model of the coach-athlete relationship will be presented, which will be used to determine the central roles of both trust and communication (Chapter 2). In a next step, trust research will be examined, in order to fully understand this complex structure. The chapter focuses on discussing different perspectives and models prevalent in trust research, before identifying one influential model to guide the rest of the research (Chapter 3). In a next step, the second central construct, i.e. communication, will be examined, specifically looking at digital communication and digitization. The goal of this chapter will be to examine how the digitization has affected and changed communication through social media and web 2.0. Furthermore, this chapter tries to answer the question of how trust is built through digital communication (Chapter 4). A final theoretical construct to be discussed is trust in technology. This chapter examines what specifically counts as technologies within this context. Furthermore, the difference between interpersonal trust and trust in technology is examined, before defining a specific model of trust in technology (Chapter 5). The concluding chapter of the theoretical background then introduces the newly developed model of trust within the coach-athlete relationship through digital communication. The chapter uses this new model as a starting point to derive specific research questions and study designs addressing these research questions (Chapter 6).

The following empirical part of this work presents the three separate studies addressing the research questions and testing the viability of the model. Study one addresses the question of how antecedents of trustworthiness are perceived either through face-to-face communication, or else through digital communication. The goal of this study is to determine whether communication mediated through a digital channel leads athletes to perceive their coach as less trustworthy (Chapter 7). In order to answer this question, an experimental design was implemented. The communication between a coach and her athletes was experimentally manipulated to be either purely face to face or entirely digital, while measuring the development of trust.

The second study focuses on the construct of trust in technology. It is the goal of this study to determine a valid and reliable measure of trust in technology. A model of trust in technology is adapted to the context of sports and exercise technologies, and validated for this specific context, as well as for the German language (Chapter 8). The methods chosen for this are a survey design, presenting a trust in technology questionnaire to a wide range of app and training technology users, and assessing the viability of the model through structural equation modeling and confirmatory factor analysis.

The final study builds upon the results of study one and study two examining how trust in technology and trust in coach interact with and affect each other. Specifically, the study examines possible negative trust transfer effects from the technology to coach. The goal is to determine whether trust in coach can suffer detrimental effects through digital communication technologies (Chapter 9). The methods chosen for this is a vignette design, presenting participants with a fictitious situation, wherein the trustworthiness of a training technology is manipulated, while measuring the trustworthiness of coach through a questionnaire.

Finally, in the third and last part of this thesis, the results of the experimental designs are discussed in a joint discussion (Chapter 10). The empirical results are interpreted on the basis of the previously proposed model and critically reflected. Adjustments to the model, as well as application of the model to future research and practice are discussed. Methodological as well as theoretical limitations of the current thesis are discussed, before a final, overall conclusion is presented.

2. Coach-Athlete Relationship

The starting point for this research work lies in the coach-athlete relationship. As seen in the introduction, this is one of the most important relationships in an athlete's life, influential beyond the athletic realm. Due to this immense importance, it is necessary for research to try and understand the nature of this relationship, how it is formed as well as the effects of good and poor relationships.

In the following sections, the importance of the coach-athlete relationship will be discussed in more detail. In a first step, the relationship will be defined, and important outcomes and relevant effects of good versus poor relationships will be discussed (2.1), before looking into various models of what makes up "good" coaching behavior (2.2). In a final step, a comprehensive model of the coach-athlete relationship will be presented and discussed, highlighting not only coaching behaviors, but rather all aspects of the relationship, including emotions and cognitions (2.3).

2.1. Identifying the Importance of the Coach-Athlete Relationship

Already early in an athlete's life, his or her coach is an important figure. Especially aspiring young athletes spend much of their weekly time with their coach: For example, in youth sport soccer academies in England, athletes as young as 11 years old already spend up to eight hours a week, while older athletes spend up to 14 hours a week training and working together with their coach (Nicholls, Earle, Earle, & Madigan, 2017). In this time, a coach can have much influence on the development of an athlete's personality, attitudes, moral ideas and overall well-being (e.g. Allan & Côté, 2016; Carleton, et al., 2016; White, & Bennie, 2015). But a coach's influence is not limited to the early phase of an athlete's life: As the athletic career progresses, coach becomes more and more important to an athlete, influencing his or her career development, athletic success and well-being (e.g. Jowett, 2007). Because of this huge impact coach can have, the coach has been of special interest to sport psychologists in practice and in research.

The importance of coach is also highlighted by the fact that coach has been in the focus of the discipline of sport psychology since the very beginnings. One of the pioneers in sport psychology, Coleman Griffith, dedicated some of his early research and practice to the role of coach (Gould & Pick, 1995). In one of his most popular books "The psychology of coaching" (Griffith, 1926) he focuses on effective coaching behaviors and psychological factors important within coaching. The book is directed at coaches and provides advice on psychological strategies coaches can employ in order to create an ideal environment for athletic and personal growth of athletes. This early pioneering work already shows, that a coach is not only important

within the realm of athletics, but in fact that coach can influence the personal development of an athlete, thus influencing their lives beyond the athletic field. Griffith (1926) highlights the importance of understanding effective coaching behaviors, as well as understanding the nature of the coach-athlete relationship. However, before focusing more closely on coaching behaviors and the coach-athlete relationship in general in Chapter 2.2, first the relationship will be described and defined on a very basic level (2.1.1). In a second step, important outcomes of good versus poor coach-athlete relationships will be discussed, highlighting the importance of examining this relationship (2.1.2).

2.1.1. Defining the Coach-Athlete Relationship

The coach-athlete relationship is an important interpersonal relationship within the sporting context. As such, it shares several characteristics of close relationships. One aspect to consider within close relationships is the distribution of power: both relationship members may have equal power or one might hold power over the other. Within the coach-athlete relationship, there is an imbalance of power: The coach has inherently more power, while the athlete is subordinate (Bergmann Drewe, 2002; Burke, 2001). The imbalance is most pronounced with mixed-sex dyads, where the coach is male, and the athlete female (Tomlinson & Yorganci, 1997). This imbalance of power has one very important consequence: Because the athlete is vulnerable and dependent on coach, trust emerges as an important construct within the relationship. The athlete must trust that coach will not abuse the power he or she has. However, the athlete is not completely without power, as she can influence coach's behavior as well. Thus, it is also important for coach to trust his or her athlete. The relevance of the imbalance of power, as well as the consequential emergence of trust will become clearer in Chapter 3, when the relationship between vulnerability and trust is discussed.

Another key element of any close relationship is that it is dynamic and changing over time. This holds true for the coach-athlete relationship as well (Jowett & Pockzwardowski, 2007). This means that the relationship is not fixed, but is subject to change due to developments in well-being or athletic success. As the athletic development progresses, so does the importance and relevance of this relationship (Bennie & O'Connor 2012; Jowett, 2007). Therefore, the dynamics of the relationship might change as well. However, time alone does not appear to be a factor that leads to changes in the relationship: in their longitudinal study, Nicholls and colleagues (2017) found no changes in the coach-athlete relationship over the course of 6 months, as measured by a questionnaire. So, for changes to the relationship to occur, it appears to be necessary for relevant changes in athletic development to happen, or key situational factors to change with time as well.

In summary, the coach-athlete relationship is characterized by an imbalance of power, and a dynamic nature. While there are many conceptualizations and research directions examining the coach-athlete relationship, these two aspects typical of any close relationship, are at the core of this important sport dyad. As the relationship changes over time, power may also shift from coach to athlete, empowering the athlete within this relationship. Or else the power may remain with coach, making the athlete vulnerable to coach throughout the relationship. Moving forward it is important to keep these points in mind. In a next step, important outcome variables examined in research will be discussed.

2.1.2. Identifying Positive and Negative Outcomes of the Coach-Athlete Relationship

The question might arise as to why this interpersonal relationship within the sporting realm has been focused on so much. After all, this is but one relationship within a complex field: Athletes have relationships with their peers, teammates, parents, and often an entire staff of coaching personnel. Why, then, is the coach-athlete relationship so special? On the one hand, the previously discussed aspects of the relationship, i.e. the imbalance of power and dynamic nature, certainly make it an interesting relationship to examine. On the other hand, however, the relationship is also interesting to examine, as coaches can have a lot of influence on their athletes. A "good" or "poor" relationship between coach and athlete can influence many aspects of both coach and athlete life. The question of what defines a good or poor relationship will be addressed in detail in chapter 2.2, discussing various models of coaching behavior specifically and of the relationship in general. However, as a starting point this chapter looks at the different areas of an athlete's life coach can influence, either positively, or negatively. The following figure (1) gives an overview over some of the areas of an athlete's life coach can influence, and some of the effects the relationship can have on the athlete.

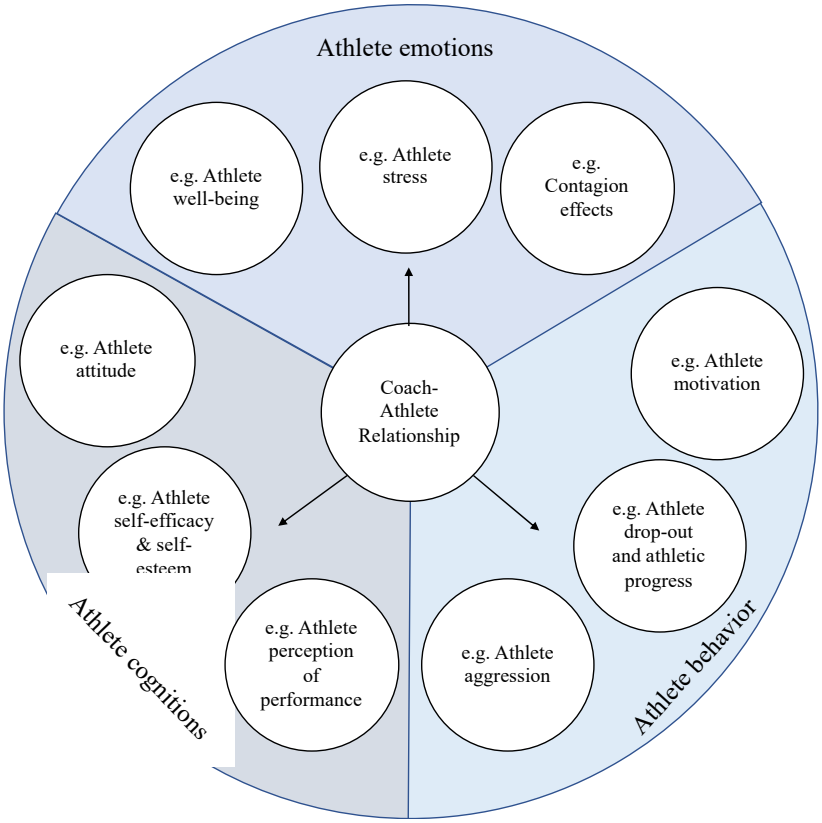

Figure 1. Areas of athlete life affected by the coach-athlete relationship Athlete's life can be both positively or negatively influenced. Figure provides exemplary findings; Figure by the author.

As the image clearly indicates, the coach-athlete relationship can affect cognitions, emotions and behavior of an athlete, thus impacting many aspects of an athlete's life. The following chapters highlight some of the exemplary findings regarding the outcomes of coaching behaviors, or else of the coach-athlete relationship in general.

Effects on Athlete Emotions. Research has examined how the coach-athlete relationship affects the emotions of athletes specifically, as well as the emotional and general well-being. On the one hand, research has found positive effects of good relationships on athlete happiness and well-being: A good coach-athlete relationship can affect athlete sport enjoyment and overall well-being. Especially in youth sports, enjoyment and fun is a key part. In their paper, Fraser-Thomas, Côte and Deakin (2005) explore avenues to foster positive youth development. They identify a positive coach-athlete relationship as an important factor impacting sports enjoyment of young athletes. With time and progressing athletic development, the importance of the relationship grows (Bennie & O'Connor 2012; Jowett, 2007). Not only in youth sport does the coach-athlete relationship affect an athletes' enjoyment. When analyzing the impact of coaching passion on coaching behaviors and the quality of the coach-athlete relationship,

researchers found that harmonious passion predicted a good relationship quality, which in turn predicted athletes' general happiness, using structural equation modeling on a sample of 103 adult dyads from gymnastics, volleyball and football (Lafrenière, Jowett, Vallerand, & Carbonneau, 2011). These studies highlight the impact the relationship can have on an athlete's happiness and general sport enjoyment.

On the other hand, the coach-athlete relationship itself can be a stressor for some athletes, affecting preparation for big sporting events. For example, looking at athletes' preparation leading up to big sporting events, e.g. Olympic Games or Soccer World Cups, studies have identified the coach-athlete relationship to be a stressor for athletes: Using focus group interviews with team members who either reached their performance goal or failed to perform as expected during Olympic games, a poor coach-athlete relationship, i.e. one characterized by lack of trust, support or respect as well as poor communication, was identified as a factor negatively influencing the preparations (Gould, Guinan, Greenleaf, Medbery, & Peterson, 1999). Using a case study approach, a poor relationship to coach was also identified as a stressor for ten female soccer players preparing for the soccer world cup finale (Holt & Hogg, 2002). Similarly, Nobelt and Gifford (2002) identified the coach-athlete relationship as a significant stressor, when interviewing 32 soccer players from the Australian league. Likewise, not the relationship in general, yet specific coach behaviors can affect athlete stress and anxiety: In their study Baker, Côté and Hawes (2002) had 228 athletes from various athletic fields fill out questionnaires on sport anxiety as well as coaching behaviors and found that negative rapport with coach lead to athletes showing more anxiety in training and competition.

Research has also looked at emotional contagion effects and spill-over form coach emotions to athlete. This research has found, for example, that stress can spill over through the relationship and negatively affect athletes (Thelwell, Wagstaff, Rayner, Chapman, & Barker, 2017). In their study, Thelwell and colleagues (2017) interviewed 13 athletes from five different sports and, using content analysis, found that athletes are able to identify coaches' stress, experience a decrease in coaching effectiveness and a decrease in the quality of the coach-athlete relationship when coach is stressed. This in turn has a negative impact on athletes' well-being. However, not only negative emotions spill over through the relationship. By measuring coach and athlete pre- and post-training well- or ill-being, Stebbings, Tylor, and Spray (2016) were able to look at spill-over and contagion effects within the coach-athlete relationship. Using actor-partner analysis, they examined 82 coach-athlete dyads from various individual sports and found that coaches were able to affect the well or ill-being of athletes, but not vice versa.

This effect was mediated by how athletes perceived their coach and how sensitive they were to his or her mood.

Overall, different affective states, such as anxiety, enjoyment, stress or overall well-being can be affected through the coach-athlete relationship. This highlights the importance of understanding this relationship, as well as the mechanisms behind specific coach behavior. Understanding how they affect an athlete can help direct the behavior of coach in a way beneficial to the athlete. However, as figure one shows, not only emotions are influenced through the relationship, but also behaviors and motivational outcomes.

Effects on Athlete Behavior. Within this area, research has looked at how coach can influence athlete behaviors, as well as motivation. For example, research has shown that coach behavior can either facilitate more prosocial behaviors in young athletes or lead to athletes showing more aggressive behaviors: Using systematic observations and athlete self-reports, Alan and Côte (2016) examined the influence of coaches' emotions during practice on the developmental outcomes of 134 female athletes. They found that calm coaches could facilitate more prosocial behavior, while intense coaches facilitated more aggressive behavior in their athletes during practice and competition. Similar findings corroborate this effect: In their study, Rutten and colleagues (2007) examined which factors of youth sport contribute to modeling youth behavior and found the coach-athlete relationship to be a significant factor. Using multilevel regression analysis on a sample of 260 male and female youth soccer players, they found that coaches maintaining good relationships to their athletes could reduce antisocial behavior. By analyzing the career development of 693 basketball players in the National Basketball Association through multilevel modeling Carleton and colleagues (2016) found that aggressive coaches lead to athletes showing more aggressive behaviors, even in the long run. Aggressive coach behavior has also been shown to have lasting effects on an athlete, even after the working relationship has ended: Especially negative interactions and abusive coach behavior can result in athletes displaying aggressive behavior in the long run, thus influencing an athlete's career (Carleton, et al., 2016). Similarly, Cassidy, Jones, and Potrac (2008) take a special look at youth sports by describing and analyzing good coaching behavior and methods in their book. They find that by providing positive environments, developing rapport and using humor, coaches can provide support to young athletes and thus help with a positive youth development. In these ways, the coach-athlete relationship can shape the behavior, moral ideas and general development of young athletes.

The coach-athlete relationship is also fundamental to athletes' motivation: For example, Gagné, Ryan and Bargmann (2003) implemented a four-week diary study, examining the

motivation and need satisfaction of 33 female gymnasts. Using hierarchical linear modeling, they found that coaches were able to affect athletes' need satisfaction and thus influenced their motivation. In these ways, coach behavior, and the coach-athlete relationship influence athlete behavior, and athlete motivation. Similarly, a good coach-athlete relationship has been associated with coach-created motivational climate (Olympiou, Jowett, & Duda, 2008). In their study, nearly 600 athletes from various team sports filled out questionnaires on the coach-athlete relationship, as well as perceived motivational climate and found significant associations between the two: The better the coach-athlete relationship, the better the motivational climate. Overall, these findings show how important a good relationship is, as it fundamentally affects how motivated athletes are, or else how they regulate their behavior. Additional to the already discussed outcomes, research has also looked at how the coach-athlete relationship affects the athletic career of an athlete.

The coach-athlete relationship is also an important factor when developing young talents. A good relationship, enjoyment and well-being can protect young athletes from dropping out of their sport, if they are struggling through difficult times. When comparing drop-outs to athletes matched for age and sex (e.g. swimmers or track and field athletes) who stay engaged in their sports, the coach-athlete relationship is a significant factor for athletes to remain involved with a sport (Bussmann, 1997; Fraser-Thomas, Côté, & Deakin, 2008). Implementing retrospective interviews with 25 drop-outs from competitive swimming revealed that apart from the quality of the relationship, it was also important for coach to spend enough one-on-one time with the athlete (Fraser-Thomas, et al., 2008). In contrast, however, a poor coach-athlete relationship can facilitate drop-out: If coaches fail to provide adequate social support through a good relationship, this negatively influences athletes' motivation and can lead to athlete burnout (Price & Weiss, 2000): In their sample of 193 female soccer players, the authors found that athletes' perception of coaching behaviors lead to more anxiety and burnout, when coaches exhibited more autocratic coaching behaviors.

Overall, these studies show that the coach-athlete relationship can have both positive and negative effects on athletes` behavior, influencing either pro-social or aggressive, or intrinsically motivated behaviors, both within the short- and long term. Besides these effects on athlete emotions and behaviors, research has also examined effects of the coach-athlete relationship on athlete cognitions.

Effects on Athlete Cognition. Studies examining athletes' cognitions have, for example, looked at how the coach-athlete relationship affects athlete self-efficacy and self-esteem. White and Bennie (2015), for example, examined how a positive relationship to coach and supportive

coach behavior can help young athletes deal with the many stressors associated with competitive youth sports, thus facilitating resilience, self-efficacy and self-esteem. Through 22 semi-structured interviews with young female gymnasts, they analyzed that question and found that interpersonal relationships, and a positive coach-athlete relationship in particular, were able to facilitate resilience and improved both self-efficacy and self-esteem. Similarly, Smoll and Smith (1989) examined how different coach behaviors influenced athlete self-esteem and athlete attitude toward coach. In a series of experiments, they examined those questions. In one sample of 542 youth athletes of various sports, they found that coach behavior influenced athlete attitudes in general and towards the coach. In a second sample examining long-term effects on 325 youth athletes, they found that supportive coach behaviors increased athlete self-confidence.

Apart from these effects on athletes' self-efficacy, self-confidence and attitudes, some studies have found that the coach-athlete relationship can affect how athletes perceive their own achievements. For example, Dirks (2000) examined the effect of coach's leadership behavior and trust in coach on athletic performance. He examined this question on a sample of 30 collegiate basketball teams comprised of 355 individual players and found that a positive, trusting relationship to coach determined how athletes evaluated their past performance, i.e. the more trusting the relationship, the better athletes assessed their performance. Similarly, Zhang and Chelladurai (2013) examined the effect of trust in coach on perceived performance. In their sample of 215 collegiate athletes, they, too, were able to show that the positive, trusting relationship to coach positively influenced how athletes perceived their own past performance.

In summary, research has shown, time and time again, that the relationship between an athlete and his or her coach is a very special one. It influences many aspects of an athlete's life, affects how he or she feels, thinks and behaves. Because this relationship touches so many areas, it is important for both practice and research to understand how desired outcomes can be achieved, while avoiding undesired outcomes. It is important to examine and understand what defines a "good" or "poor" relationship, in order to foster those positive aspects, while at the same time such behaviors and factors facilitating negative outcomes are avoided. The following paragraphs therefore explore different models of the relationship, as well as models of coaching behavior and try to answer those questions.

2.2. Models of Coaching Behaviors

Research has focused on coaching behaviors and tried to determine which behaviors were effective or less effective. Throughout the course of research, different perspectives and approaches to the question of effective coaching behaviors have been chosen: Some researchers

have focused on leadership (Chelladurai, 1990) or needs supportive behaviors (e.g. Gagné, et al., 2003; Mageau & Vallerand, 2003), while others have examined effective behaviors based on coaching outcomes (e.g. Côté & Gilbert, 2009; Smith & Smoll, 1989). These different models will be discussed in the following sections.

2.2.1. Mediational Model of Coach-Player Relationships

One early attempt to understand the dynamics between good coaching and athletic success was made by Smith, Smoll, and colleagues (e.g. Curtis, Smith, & Smoll, 1979; Smith, et al., 2007; Smoll & Smith, 1989; Smoll, Smith, Curtis, & Hunt, 1978): In their *Mediational Model of Coach-Player Relationships* they focused their research on effective coaching behaviors, athletes' cognitive and affective evaluation of those behaviors, as well as interactions between coach and athlete. Their model was originally developed based on an interactional perspective and models of leadership behavior for a youth sport setting, as well as social learning theory. A key element of the model, hence the name *mediational model*, is the mediating role of athlete perception of coaching behavior. The coach behavior alone is not decisive in predicting an outcome, but rather the athletes' perception and evaluation of this behavior is the important factor.

The goal of the research was to assess how different behaviors are perceived by athletes and lead to good athletic results and then train coaches to show those behaviors. Furthermore, they aimed to develop more valid measures for assessing good leadership behaviors, by applying behavioral assessment techniques, rather than questionnaires. Throughout their research, Smoll & Smith also analyzed individual differences between coaches, as well as player individual differences and situational factors affecting coach and athlete.

In order to assess coaching behavior, Smith, Smoll and Hunt (1977) developed the Coaching Behavior Assessment System (CBAS). This system was developed by analyzing coaching behaviors during practice and competition. It allows the observer to categorize coaching behavior into 12 categories, belonging either to the class of reactive behaviors (e.g. mistake-contingent encouragement), or spontaneous behaviors (e.g. general technical instruction; see figure 2 for an overview of coaching behaviors and model specifications). The scouring system has since been used in many different settings, indicating a comprehensive, reliable and valid coding system for coaching and leader behaviors in sports (Curtis, et al., 1979; Smoll & Smith, 1989).

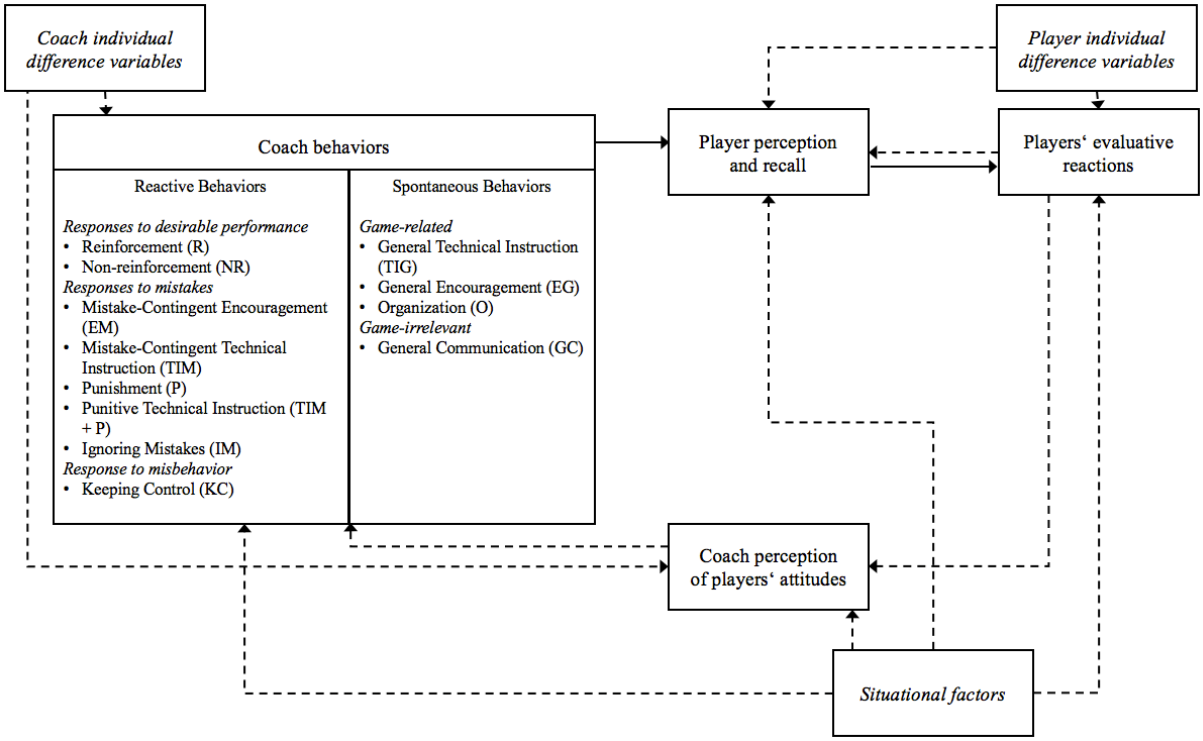

Figure 2. Mediational Model of Coach-Player Relationships.
Model includes the categories of coach behavior as specified by the Coaching Behavior Assessment System (CBAS); Depiction by author based on Smoll and Smith (1998).

Much of the research implementing the CBAS has since tried to evaluate coaching behaviors through the coding system, while also assessing coach and athlete perceptions of coaching behaviors as well as athletic outcomes over the course of one or several athletic seasons (Curtis, et al., 1979; Smoll & Smith, 1989). Thus, the researchers aimed at identifying coaching behaviors associated with a good working relationship, athlete well-being and athletic success. Furthermore, the goal was to identify how well both coaches and athletes were able to assess the different types of coaching behaviors. Using factor analysis, Smith, Smoll, and colleagues later grouped observed coach behaviors into one of three categories: supportiveness, instructiveness or punitiveness and found that supportiveness, as well as instructiveness were positively associated with higher levels of general or athletic self-esteem respectively (Curtis, et al., 1979; Smoll & Smith, 1989; Smoll, et al., 1978). By comparing self-assessed coaching behaviors as well as athlete perceived coaching behaviors with the CBAS rating, the researchers were able to show that coaches self-assessed coaching behaviors show low accordance with the

behaviors rated using the CBAS rating system, indicating they are not good at assessing which types of behavior they show throughout a season. Athletes, on the other hand, had a high correlation with the CBAS rating, indicating they are better at identifying coaching behaviors (Curtis, et al., 1979; Smoll & Smith, 1989).

Besides assessing coach behavior, part of the research also focused on training coaches to show certain behaviors and then assessing various outcomes, such as athletic drop-out, performance, anxiety or athlete self-esteem. Various studies, implementing different methods and samples have tried to assess the impact of coach training programs addressing the behaviors specified in the CBAS. Studies implementing case study approaches with small sample sizes and individualized coach training (e.g. examining only 4 coaches: Sousa, Smith, & Cruz, 2008), as well as field experiments with larger sample sizes and group training (examining up to 37 coaches at once, e.g. Barnett, Smoll, & Smith, 1992; Smith, Smoll, & Barnett, 1995; Smith et al., 2007; Smoll, Smith, Barnett, & Everett, 1993) assess coach behavior, coach assessment of behavior as well as athlete perceived behavior, before and after the season and compare a treatment group with a non-treatment group. These studies find that the interventions aimed at training coach behavior can lead to changed behavior, changed athlete perceived behavior and better athletic outcomes (e.g. fewer dropout as in Barnett et al., 1992 or reduced performance anxiety, as in Smith, et al., 1995), as well as better self-awareness of the coaches. Furthermore, research has been able to show long-term changes in coach behavior, as well as athlete outcome: By comparing both athlete outcomes, as well as coach behaviors after a coach training with a one year follow-up in little league baseball, Smith, Smoll and Curtis (1979) were able to show maintained changes.

Overall, with the Mediational Model of Player-Coach Relationship, Smith, Smoll and colleagues developed an empirically derived, behavior centered conceptualization of the coach-athlete relationship, focusing on athlete perception of coach behavior. The research aimed at identifying specific coach behaviors leading to desirable outcomes for athletes, thus giving important insights into effective coaching behaviors. However, while the model showed some merit for application and practice, it was also lacking a firm theoretical foundation, as it was empirically derived. Thus, there was a need for a more theory-centric model, explaining coaching behavior based on theories of leadership and coaching. This need was filled by the Multidimensional model of sport leadership, which is described in a next step.

2.2.2. Multidimensional Model of Sport Leadership

Another perspective, the *Multidimensional Model of Sport Leadership* (MML) by Chelladurai and colleagues (e.g. Chelladurai, 1980; Chelladurai, 1990; Chelladurai & Saleh,

1980), emerged at a similar time. This line of research focused on different types of leader behaviors and how well those behaviors are received. It was developed in order to fill a gap for adequate, sport specific models of leadership. Furthermore, the model was developed in order to derive specific, testable hypotheses as well as valid measurement scales. This model thus filled the gap left by the Mediation Model of Player-Coach Relationships, as it could provide a theoretical foundation, based on existing leadership models.

Specifically, the model suggests that desired outcomes (e.g. athletic success or satisfaction and well-being) are a function of how well the behavior preferred by athletes matches the actual behavior coach shows and the behavior required in a specific situation. When actual, preferred and required behavior match, the outcomes will be positive (see figure 3). The model specifies five different types of leader behavior: training and instruction, democratic or autocratic behavior, social support or rewards, and feedback, and suggests that a good leader shows all types of behavior. Lastly, the model also takes certain antecedents into account, i.e. situational, coach and athlete characteristics. For example, the situational characteristics (e.g. final game in a season, last chance for a team to avoid relegation, as well as social or cultural team norms) might require coach to show more autocratic training behavior. If individual coach characteristics (e.g. a very autocratic coach) of coach are in line with this, coach will display autocratic behavior. Assuming the team prefers a more democratic leader behavior., the model predicts this will lead to poorer outcomes. In the example, the required and actual coach behavior are matched, yet, they do not match the preferred leader behavior by the athletes. Thus, the models specify the necessity to consider all three factors, when assessing the impact on outcomes.

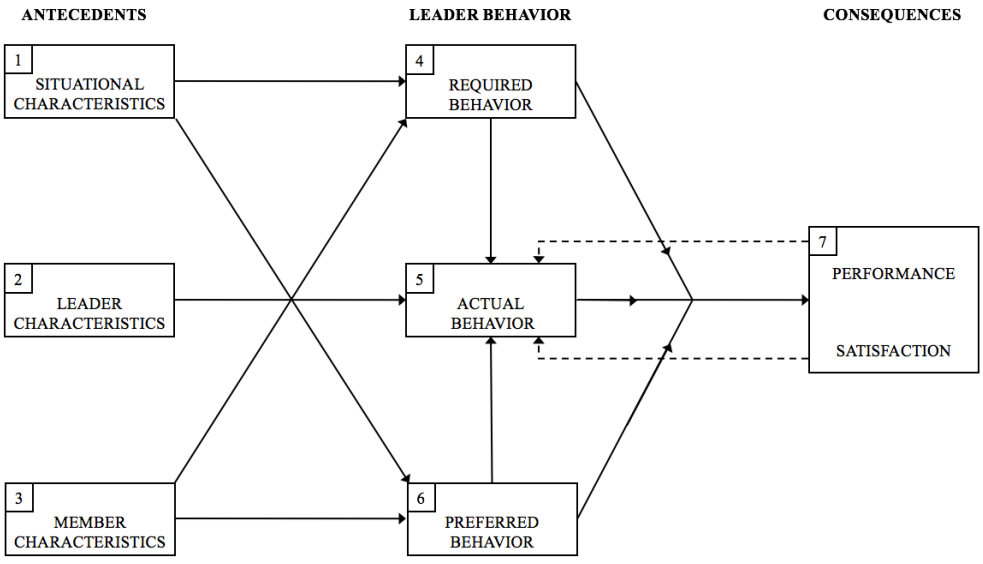

Figure 3. Multidimensional Model of Sport Leadership
Depiction by author, based on Chelladurai (1990).

In order to assess different coaching behaviors, the Leadership Scale for Sports (LSS, Chelladurai, 1990; Chelladurai & Saleh, 1980) was developed through exploratory as well as confirmatory factor analysis. The questionnaire was developed and tested on several different samples of physical education students and revised and adapted in between each test. The final version of the questionnaire exists in three adapted versions that can be used to assess athletes' perceptions of coaching behavior (e.g. Chelladurai & Saleh, 1980; Horne & Carron, 1985) athletes' preference for coaching behaviors (e.g. Chelladurai & Saleh, 1980; Horne & Carron, 1985; Sherman, Fuller, & Speed, 2000) as well as coaches' perceptions of their own leader behavior (e.g. Brooks, Ziatz, Johnson, & Hollander, 2000; Horne & Carron, 1985). For example, Horne and Carron (1985) aimed to examine the compatibility of coach and athlete. In their study, they examined 74 athletes from both team and individual sports and their coaches, forming 74 dyads and used all three versions of the LSS, measuring athlete perceived and preferred leadership behavior, as well as coach perceived behavior. They found large discrepancies between the perceived behavior of coach and athlete, and found that this predicted some of the athlete dissatisfaction. Sherman and colleagues (2000), used a different approach and implemented the questionnaire solely in the athlete version, assessing preferred leader behavior as a function of gender. They assessed preferred leader behavior of 317 Australian team athletes from various sports, as well as athlete and coach gender. However, in their study they found no conclusive correlations. Implementing only the coach version of the LSS, the leadership behavior of head and assistant strength and condition coaches was analyzed (Brooks, et al., 2000). In their sample of 53 coaches, they found no differences in leadership behavior of head or assistant coaches. Overall, the LSS has been implemented in various settings, for different target groups, assessing leadership behavior. Thus, Chelladurai and colleagues achieved their goal of developing a valid measurement instrument for leadership behavior.

Over the years, the LSS specifically, as well as the Multidimensional Model of Sport Leadership have been used to assess the quality of coaching behaviors and its impact on athlete wellbeing, satisfaction and athletic success. Riemer (2007) gives a comprehensive overview of typical questions, methods and findings of research implementing both the MML and LSS: Much of the research has been descriptive, typically assessing both coach and athlete characteristics (e.g. age, gender, experience, time spent within a team) via self-report, and examining correlations with preferred leadership style. Studies, for example, examine different leader behaviors preferred by male or female athletes. However, this research has yielded inconclusive and mixed results. Further studies do not assess athlete characteristics, but rather situational characteristics (e.g. team or individual sports, or cultural aspects) that influence

preferred leader behavior. For example, Riemer and Toon (2001) examined the influence of athlete gender and level of ability on preferred leader behavior. In their sample of 148 tennis players, they found that gender only accounted for part of the variance in a preference for autocratic behavior and positive feedback, while the gender of coach was able to explain athletes' preference for social support behavior. Athletes of lower ability preferred more positive feedback, than athletes of a higher level of ability. Pfeffer, Würth and Alfermann (2004) examined athletes' preference of coach behavior both within individual as well as team sports, along with expert ratings of performance improvement. In their sample of 212 youth elite athletes they found that athletes participating in individual sports showed a greater improvement in their performance when perceiving coach to show more positive feedback, and less social support behaviors. Athletes in team sports, on the other hand, improved their performance more when reporting perceived social support behaviors, rather than positive feedback. Horn, Bloom, Berglund, and Packard (2011) examined athletes' preference for leader behavior as a function of psychological characteristics such as motivational orientation. In their sample of 195 collegiate athletes they found that athletes who were high in self-determined motivation preferred a democratic leadership style. Athletes who were high in amotivation, on the other hand, preferred an autocratic leadership style.

According to Riemer (2007), another line of research typically pursued by researchers implementing the MML is to examine the correlation of various outcomes (e.g. athletic success, well-being) and athlete perceived leadership behavior, as well as coaches' perceptions of leadership behavior. Shields, Gardner, Bredemeier, and Bosto (1997), for example, examined the impact of athlete perceived and preferred leader behavior on team cohesion in a sample of baseball or softball players at the high school or college level. They found a strong correlation between perceived leader behavior of training and instruction as well as social support and democratic behavior with task cohesion.

In summary, the Multidimensional Model of Sport Leadership by Chelladurai (1990) offers a more theoretically derived, behavior centered conceptualization of the coach-athlete relationship, focusing on athlete preference for coaching behaviors. This research has provided a valid and reliable measure of leadership behaviors, as well as given decisive insights into effective and efficient coaching behaviors from a theoretical perspective. Yet, the described behaviors in this model are fairly abstract, making a specific application for practice more difficult.

Attempts have been made to integrate these two conceptualizations (i.e. the Mediational Model of Coach-Player Relationships and Multidimensional Model of Sport Leadership) and

specific hypotheses were formulated on how the dimensions of the LSS would relate to the categories of the CBAS (Chelladurai, 1993). Specifically, Chelladurai predicts that certain behavioral dimensions of the CBAS would fall within either the training and instruction dimension, feedback dimension or social support dimension. In an attempt to test those hypotheses and integrate and compare the two conceptualizations, Cumming, Smith, and Smoll (2006) had a sample of 645 female high school athletes complete both the LLS and the CBAS scales at the end of a competitive season. Both scales were able to explain similar and significant amounts of variance regarding the liking of coach and the evaluation of coaching competence. Furthermore, the analysis was able to confirm Chelladurai's predictions concerning the correlation of CBAS and LSS dimensions. However, the discriminant validity shown by both scales was fairly low, as there was a strong overlap between the two scales. This suggests that, while both conceptualizations have provided individual and valuable insight, they also share considerable conceptual overlap.

2.2.3. Need Supportive Coach Behavior

Because of the limited view of the models discussed thus far, further conceptualizations of the coach-athlete relationship have been derived. For example, newer approaches to examining coaching behaviors have looked to *Self Determination Theory* (SDT, Ryan & Deci, 2000) and tried to analyze which coaching behaviors can fulfill athletes' psychological needs and foster intrinsic motivation (e.g. Gagné, et al., 2003; Mageau & Vallerand, 2003). In its simplest form, research applies SDT directly to the coaching process: Mallet (2005) describes a case study, wherein SDT was used to design an autonomy-supportive motivational climate in the preparation of elite Australian athletes for the Olympic Games. In his paper, Mallet (2005) describes how the autonomy supportive environment was created, yet a scientific evaluation of the coaching behaviors was not possible. However, many other studies have applied SDT to coaching behavior. Assessing athletes' perception of autonomy supportive behaviors of coaches along with athletes' need satisfaction, various studies have found the expected connection in samples of high school athletes (e.g. Amorose & Anderson-Butcher, 2007), Paralympic athletes (e.g. Banack, Sabiston, & Bloom, 2011), adult athletes competing at club level (e.g. Adie, Duda, & Ntoumanis, 2008) or young elite gymnasts (e.g. Gagné, et al., 2003).

Taking SDT a step further, Mageau and Vallerand (2003), integrated SDT into the *Motivational Model* of the coach-athlete relationship. In their paper, Mageau and Vallerand (2003) describe which coach behaviors foster autonomy, through which psychological processes coaching behaviors influence athletes' motivation as well as which social and personality processes determine coaching behaviors. They propose a motivational sequence of

factors (i.e. coaches' personal orientation towards coaching, context conditions and coach perception of athlete behavior and motivation) which influence the coaching behaviors of coaches (see figure 4). The model further suggests that coaches' autonomy supportive behaviors as well as provision of structure and involvement have a beneficial impact on athletes' basic psychological needs of autonomy, competence and relatedness.

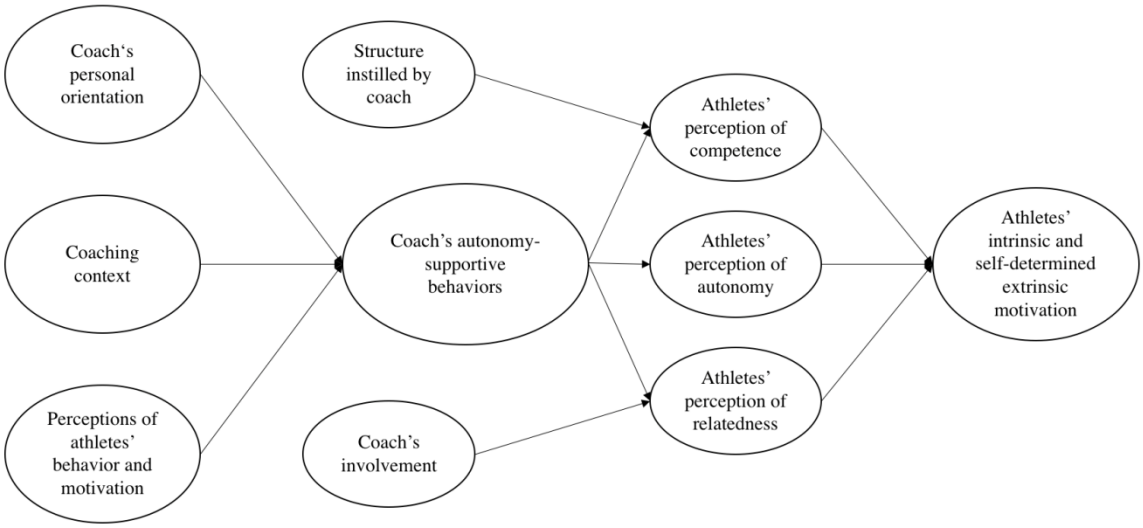

Figure 4. Motivational Model of coach behavior.
Depiction by author, based on Mageau and Vallerand (2003).

Furthermore, the "autonomy supportive behaviors" described in the model are grouped into seven categories by Mageau and Vallerand (2003, p. 887):

"(1) Providing choice within specific rules
(2) Providing a rationale for tasks
(3) Acknowledging the feelings and perspectives of players
(4) Provide players with opportunities for initiative taking and independent work
(5) Providing players with non-controlling competence feedback
(6) Avoiding controlling behaviors
(7) Avoid ego-focusing in athletes"

Since the initial presentation of this model, many researchers have sought to test and validate the model and described behaviors. For example, Vazou, Ntoumanis and Duda (2006) implemented the motivational model of the coach-athlete relationship, in order to examine which coach behaviors influence motivational climate and state anxiety in a sample of almost 500 young athletes from various fields of sports. They were able to apply the seven categories

of coach behavior in their study, and found that the need supportive behaviors were able to reduce state anxiety and positively influence motivational climate. In another study examining athletes' perception of coaches' interpersonal behavior (autonomy supportive or controlling), 369 competitive swimmers filled out questionnaires about perceived coach behavior at three different times throughout the competitive season (Pelletier, Fortier, Vallerand, & Briere, 2001). They found that coaches' behavior in practice affected athletes' self-regulated motivation. Similarly, when examining the effect of coaches' interpersonal controlling style as defined by the motivational model, Ramis, Torregrosa, Viladrich, & Cruz (2017) found that coaches' controlling style predicted athlete anxiety, worry and concentration disruption during competitions.

In addition to these studies examining motivation and emotional states in athletes implementing the motivational model, some studies have used the model to examine athlete basic need satisfaction: In a longitudinal study examining whether changes in perception of coaching behavior lead to changes in vitality and well-being, Balaguer and colleagues (2012) found that more autonomy supportive behaviors (as measured by the motivational model) were positively associated with need satisfaction of nearly 600 young soccer players. Similar results were found in a study analyzing the changes in coaching behavior and well-being over the course of two seasons of 360 young soccer players (González, García-Merita, Castillo, & Balaguer, 2016).

Overall, the motivational model and studies implementing it have provided valuable information for research in coaching. The seven categories of coaching behavior are valuable when coding observed behavior, and the adaption of SDT into the coaching context is following an ongoing trend in sport psychology research, using SDT to explain exercise behavior. Yet, at the same time, the practical application of the seven coaching behaviors can be criticized: The behaviors are described in a very abstract way and are not very specific. For coaches, the model is not very helpful, as it does not provide them with specific instructions or information on what to do.

For this reason, additional models of the coach-athlete relationship will be considered in the following. All models discussed so far have focused on effective and efficient coaching behaviors. However, this commonality is also a weakness of these models: by focusing only on the behaviors shown by coach within the relationship they neglect to consider the complexity of close relationships. It is necessary to consider other important aspects, such as emotions and thoughts.

2.2.4. Relationship Focused Models

Some attempts have been made to view this significant, dyadic relationship within a broader context. For example, Wylleman (2000) examines close relationships within the sporting context in general, identifying the athlete-parent, athlete-coach, as well as parent-coach relationships as important, thus describing the athletic triangle. Wylleman (2000) argues that it is crucial to examine various relationships within the sporting setting, as well as examine those relationships bi-directionally, taking both dyad members' perspectives into account. In this conceptualization of close relationships, a phenomenological approach is adopted and interpersonal behaviors are interpreted in light of three dimension: acceptance-rejection, dominance-submission as well as a social-emotional dimension. This allows the operationalization of complementarity between induvials, e.g. the coach and his or her athlete. In order to measure and evaluate this conceptualization, the Sport Interpersonal Relationship Questionnaire (SIRQ) was developed for the coach-athlete, athlete-parent and coach-parent relationship. Using this model and assessment method, Wylleman (2000) is able to identify athletes' perception of various relationships within different settings, adding to the knowledge of effective coaching within the coach-athlete relationship.

In another attempt to integrate existing conceptualizations of coaching effectiveness, Côté and Gilbert (2009) propose an integrative definition of coaching effectiveness. Their goal is to find a conceptualization of effective and efficient coaching, in order to define the features of a good coach. To do this, they draw upon coaching, teaching, positive psychology and athlete development research. In their paper, they discuss existing coaching literature and criticize, that coaching effectiveness cannot solely be judged by examining only behaviors. Instead, they propose it is necessary to look at three elements: *Coaches' knowledge*, including his behaviors, disposition, experience and education, *athletes' outcomes*, including competence, confidence, connection and character, as well as *coaching context*, including athlete age, developmental level, needs, and goals. This conceptualization offers a good definition of effective coaching, applicable both to research and practice. However, it does not offer a definition of what makes up a good coach-athlete relationship. Additionally, this conceptualization, again, focuses only on the coach perspective, rather than viewing both perspectives of the dyadic relationship.

A few conceptualizations of the relationship have attempted to focus on both coach and athlete perspective. One such model, for instance, is LaVoi's (2004; 2007) conceptual model of the relationship, coming from a relational-cultural view and examining closeness and interdependence within the relationship. This model focuses on sociocultural norms and rules within the coach-athlete relationship and addresses both the coach and athlete perspective.

Another approach has been to look at coach and athlete personality traits, as well as their compatibility: By implementing actor-partner interdependence models and assessing the Big Five personality traits of 91 coach-athlete dyads as well as relationship commitment and relatedness, Jackson, Dimmock, Gucciardi, and Grove (2011) found that especially dissimilarities on the dimensions of extraversion and relatedness lead to lower commitment and relatedness.

Yet, all these various models and conceptualization of the coach-athlete relationship, while considering different aspects (e.g. behaviors, sociocultural norms or personality traits), usually only focus on one aspect of the relationship, e.g.. only on behaviors, thoughts or emotions exhibited by coach or athlete. These models are still used in current research and practice and hold their merit for this purpose. Especially for specific research questions addressing specific aspects of the coach-athlete behavior or focusing on coach behaviors the models are valuable. However, the models fail to capture the full complexity of the coach-athlete relationship as an interpersonal relationship. Yet, this is important for the current research: In order to derive the central research question and model, it is necessary to view the coach-athlete relationship in its complexity as an interpersonal relationship, in order to ground the constructs and theories used. Therefore, another conceptualization most important for the current research must be considered and will be discussed in its own chapter.

2.3. The 3+1 C's Model of the Coach-Athlete Relationship

A more extensive conceptualization of the coach-athlete relationship was developed by Jowett and colleagues (e.g. Jowett, 2007; Jowett & Cockerill, 2002). This conceptualization of the coach-athlete relationship draws on literature from interdependence theory, defining dyadic relationships as situations, in which emotions, behaviors and thoughts of two people are mutually interdependent (Kelley, et al., 1983). The model focuses both on the coach and athlete perspective, incorporates behaviors and emotions and provides a basis both for practice and for research.

In this model, the interdependence is an essential and inevitable part of the coach-athlete relationship (Jowett, 2005; Jowett, 2007). This means that the emotions, thoughts and actions of each relationship member affects the emotions, thoughts and actions of the other member. Coach's behavior can influence an athlete's behavior, emotions or thoughts. An athlete's behavior, on the other hand, can influence and reaffirm or contradict a coach's coaching style. Another important aspect of interdependence theory and this conceptualization of the coach-athlete relationship is the interdependence of outcomes: This refers to the fact that the rewards (e.g. athletic success, motivation, or well-being) or costs (e.g. conflict, frustration, failure) of

the relationship for one person are intertwined with the rewards and costs of the relationship for the other person (Jowett, 2007).

The model was developed through extensive qualitative research: Jowett interviewed both typical (e.g. Jowett & Cockerill, 2003) as well as atypical (i.e. married dyads, or parent-child dyads, e.g. Jowett & Cockerill, 2002; Jowett & Meek, 2001) coach-athlete dyads on the highest competitive level. Using semi-structured interviews and content analysis, Jowett defined the key elements of her model, i.e. the constructs of closeness, commitment, complementarity and co-orientation (see figure 5; the constructs will be explained in more detail in the following chapter 2.3.1.). These constructs were identified as relevant both for the a-typical dyads as well as for typical dyad members. Furthermore, Jowett examined both same sex, as well as mixed sex dyads, showing a broad applicability of her model.

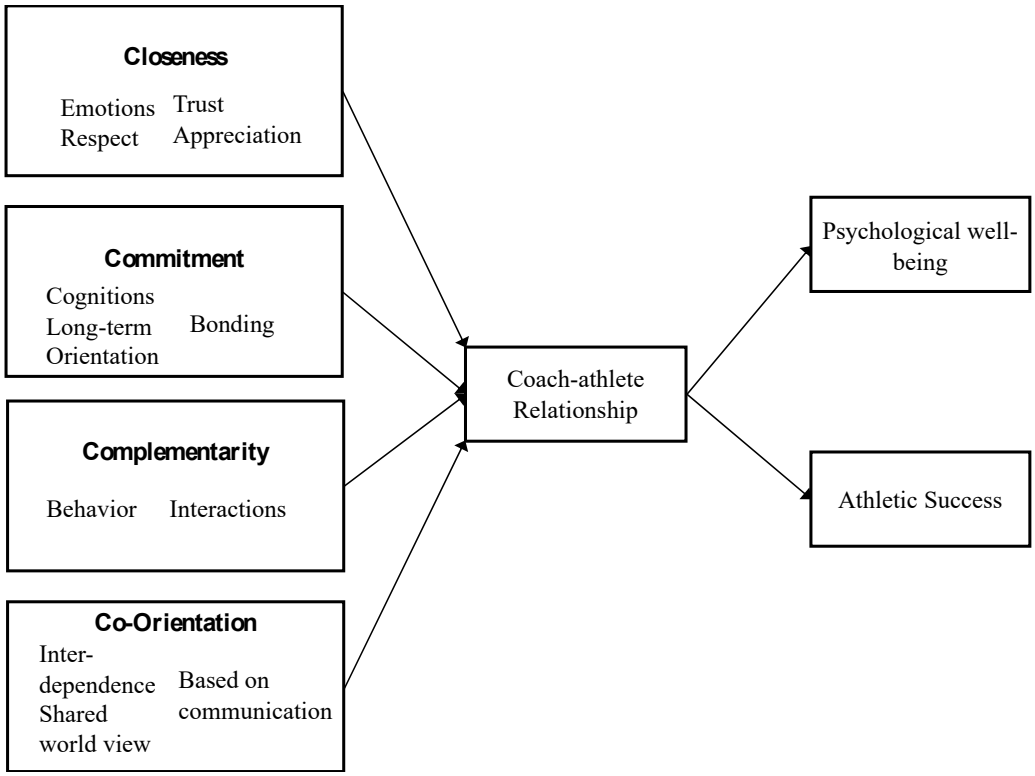

Figure 5. Jowett's 3+1 C's Model of the coach-athlete relationship.
Depiction by the author, based on Jowett & Pockzwardowski (2007)

Since then the model and its structure has been confirmed through quantitative analyses using the Coach-Athlete Relationship Questionnaire (CART-Q) and confirmatory factor analysis (Jowett, 2009; Jowett & Ntoumanis, 2004;). Based on the qualitative findings, a pool of items was developed with the goal of achieving a broad applicability of the questionnaire across dyad types (typical or atypical), as well as across expertise level. The initial version of

the questionnaire, consisting of 23 items, was tested on a pool of 120 athletes and coaches ranging from club to international level. Based on findings from that pool, a revised version containing only 11 items was assessed in a sample of 214 athletes and coaches and a confirmatory factor analysis was run, revealing good psychometric values (Jowett & Ntoumanis, 2004). Similarly, the meta perspective of the questionnaire confirmed the structure, by adapting the items to assess how athletes felt their coaches perceived them: In a sample of 201 athletes implementing confirmatory factor analysis, the structure of the model was confirmed for the meta perspective. In another sample of 189 athletes and 138 coaches from various athletic levels the validity of the model was established by also assessing athlete satisfaction (Jowett, 2009).

2.3.1. Defining the 3+1C's Model

In the course of her research Jowett identified first three and later four important facets of the coach-athlete relationship: closeness, commitment, complementarity and co-orientation (Jowett, 2007; Jowett & Pockzwardowski, 2007). The closeness, commitment and complementarity describe the affective, cognitive and behavioral dimensions respectively prevalent in any close relationship and describe the aforementioned interdependence (Jowett, 2007). Jowett was the first to apply these dimensions of interpersonal relationships in conjunction with the coach-athlete relationship, in order to assess and describe the quality of the interpersonal relationship (Jowett & Cockerill, 2002). The fourth C, the co-orientation was later defined as an open channel of communication and was derived using interpersonal perception method (Jowett & Cockeril, 2002).

The affective component of the relationship, the closeness dimension, describes the degree of mutual liking, respect and trust (Jowett, 2007). This dimension contains the emotional tone of the relationship and reflects the extent and depth of the attachment between the two, as well as their connection (Jowett & Cockerill, 2002). This factor is derived from both the coach's and the athletes' previous relationship experience (Jowett, 2007). Within the coach-athlete relationship, it is important for both parties to feel appreciated, helped and supported through the other (Jowett & Meek, 2000). The factor of commitment describes the cognitive component of the relationship. It includes the long-term orientation of both dyad members to remain within the relationship. Furthermore, this dimension includes thoughts of attachment and the intention to remain within the relationship (Jowett, 2007). The complementarity dimension, i.e. the behavioral component of the relationship, includes a reciprocal and corresponding cooperation (Jowett, 2007, Jowett & Cockerill, 2002). The dimension describes the types of interaction coach and athlete share, with negotiation of key relationship issues as an important factor

(Jowett & Meek, 2000). Different behaviors coach shows can impact an athlete's performance, satisfaction, and self-esteem (Jowett & Meek, 2000).

Lastly the fourth dimension of co-orientation describes opinions and views shared by both relationship partners (Jowett, 2007; Jowett & Cockerill, 2002;), as well as the degree of interdependence of the other three components (Jowett, 2007). In early versions of the model, this dimension was meant to represent the cognitive aspect of the close relationship (Jowett & Cockerill, 2002; Jowett & Meek, 2000), however, later versions could not confirm this model structure (Jowett & Cockerill, 2002; Jowett & Ntoumanis, 2004). Co-orientation is formed over time, as the relationship progresses and mutual experiences are shared, thus forming a common ground, agreement and similar view of the world (Jowett & Meek, 2000). Direct and verbal communication is especially important for a co-oriented view to be built (Jowett & Meek, 2000). Three sub-dimensions can be identified for the dimension of co-orientation, i.e. assumed and actual similarity, as well as empathic understanding.

According to Jowett's model these four factors determine the quality of the relationship, which in turn can influence both the psychological wellbeing as well as the athletic success of both coach and athlete (see figure 5). The components of the model can be used to identify compatibility or incompatibility within the coach-athlete relationship and thus identify "good" or "bad" relationships (e.g. Jowett & Cockerill, 2002).

Overall, this model offers a theoretically derived and empirically validated model, depicting the complexity of the interpersonal coach-athlete relationship. Studies implementing this model have since been able to show its merit in research, as well as in practice, determining the quality of the coach-athlete relationship and giving insight into how to improve the relationship. The 3+1 C's model was later adapted and different conceptualizations of the coach-athlete relationship have been put together into a comprehensive model of the coach-athlete relationship (Jowett & Pockzwardowski, 2007): in this conceptualization individual characteristics of coach and athlete (e.g. age, gender, personality), the wider socio-cultural context (e.g. customs, norms, sport context in culture) as well as relationship characteristics (e.g. typical versus atypical or duration) are considered to be parameters determining the quality of the relationship. These factors influence, through interpersonal communication, both coaches' and athletes' feelings, thoughts and behaviors, thus integrating Jowett's three C's. These, in turn, affect both inter- and intrapersonal outcomes, as well as group outcomes, which have a reciprocal effect on the feelings, thoughts and behaviors. Communication plays an essential role within this integrative model, as it bridges the gap between the antecedents,

components of the relationship, and relationship outcomes. The role of communication, as well as trust, within this model, will be discussed in more detail in the following sections.

2.3.2. The Role of Trust and Communication within the 3+1C's Model

This conceptualization of the coach-athlete relationship has many advantages. It considers the coach's as well as the athlete's perspective on the relationship. Furthermore, it considers more than just the behaviors, but incorporates thoughts and emotions as well, providing a full picture of this close relationship. This gives both researchers and practitioners a general structure to use. They can draw general conclusions from this model for future research or for coaching practices.

The model also offers a good starting point for the current research: It identifies the constructs of trust and communication as important and relevant aspects of the close relationship. These two constructs are central to the current research question and their role within this model will the highlighted here.

The first important factor is derived from the closeness dimension of this model. It describes the affective ties between coach and athlete and includes the component of trust. Thus, trust emerges as a factor in this model. As described previously in the introduction, the imbalance of power immanent to the coach-athlete relationship further facilitates the necessity of trust. The model specifies that both coach and athlete must share similar degrees of trust, in order to establish and maintain a good relationship, specifically on the dimension of closeness.

Some research has examined the direct impact trust has on the relationship. While trust will be discussed in more detail in the following Chapter 3, some key findings from sport-psychological research will be highlighted here. Trust influences commitment to and cooperation with coach, as well as perceived and actual performance: In one study, 215 competitive university athletes responded to questions on trust in coach, commitment to coach, willingness to cooperate as well as perceived performance (Zhang & Chelladurai, 2013). Structural equation modeling revealed that trust in coach had direct effects on all three variables. In another study, 161 futsal and volleyball players evaluated trust in coach, commitment and perceived performance (Nikbin, Hyun, Iranmanesh, & Foroughi, 2014). The results indicate that increased trust leads to higher commitment, as well as higher perceived trust. In a study linking trust in coach not only to perceived trust, but to actual improved trust, a sample of 355 athletes from 30 different collegiate basketball teams were examined (Dirks, 2000). The study examined the relationship between trust, leadership and team performance. Using regression analysis, Dirks found that trust in coach accounted for a significant amount of

athletic performance, after controlling for other aspects. Additionally, trust in coach mediated the relationship between past and previous performance.

Overall, some research within the field of the coach-athlete relationship has examined the specific role of trust. However, these studies are only sporadic and lacking a firm theoretical base. The research is neither imbedded in a general framework of the coach-athlete relationship, nor is the research imbedded in a general model of trust. This, surprisingly, is still lacking within the field of coach-athlete relationship research. The current research, thus, aims at filling this gap, and providing a research model and general framework, of how to imbed trust research within both theories of trust, as well as within the field of coach-athlete relationship studies. Therefore, a general introduction into trust research will be provided in the following chapter.

The second important factor derived from this model is concluded from the fourth C, the co-orientation dimension. This dimension specifies the importance of communication for coach and athlete to develop a co-orientated view, sharing common ground and a shared world view. Verbal communication is especially important for coach and athlete to develop a co-oriented view of the world (Jowett & Meek, 2000). Effective communication can be used to identify problems within the relationship, resolve them and maintain balance within a harmonious relationship (Jowett & Cockerill, 2002). Communication bridges the gap between coach and athlete and is the main platform used to convey technical instructions, tactical information, as well as emotions, care and concern (LaVoi, 2007).

In an attempt to identify the role of communication between coach and athlete, Borggrefe and Cachay (2015) examined the communication patterns of high performing coach-athlete dyads using content analysis. They identify common barriers and problems within the communication and highlight the importance of communication strategies when communicating in competition settings under pressure. Furthermore, they describe the potential for conflicts through poor communication, highlighting the relevance of good communication for a good working relationship. Poor communication can negatively influence the cooperation, as well as directly negatively impact athletic outcomes.

Overall, the importance of communication for the coach-athlete relationship has been shown many times: Communication is key to maintaining balance within the relationship and can be used to identify, as well as resolve, problems and issues within the relationship (Jowett & Cockerill, 2002). Verbal and direct communication is especially important for a co-oriented view of the world to be built, and thus is for the development of a good relationship (Jowett & Meek, 2000). Brought concisely to the point, Montgomery and Baxter (1998) state that communication is the bridge, gapping the space between coach and athlete.

While studies have indeed examined the coach-athlete communication systematically, examining good and poor communication, no research has linked that research to the development of trust. The general role of communication for relationship building has been examined, yet not specifically which aspects of communication might foster or hinder the development of trust in coach. This is a second aspect the current research addresses.

Thus, using the 3+1 C's model as a starting point, the two constructs important for the current research are highlighted and put into the context with other important factors of the coach-athlete relationship. Both trust and communication are important factors, influencing the quality of the relationship (through the components of closeness and co-orientation respectively), as well as directly impacting outcomes such as athletic success. The model offers a basic framework from which to start building a research question: How does communication influence the development of trust within the coach-athlete relationship? Nonetheless, some limitations of the model must be considered before moving forward, examining the relevant constructs in more detail and developing specific research questions.

2.3.3. Limitations of the Model

The biggest limitation of this model is the lack of clear definitions or operationalization of key constructs. For one, the model does not clearly specify which constructs are predictor or outcome. Both trust and communication can be seen as a factor influencing the quality of the relationship, as well as a factor influenced by the relationship, i.e. they are both predictor and outcome of a good relationship. Trusting behaviors can lead to a better relationship, while a good relationship can lead to more trust. Similarly, good communication can lead to a better relationship, while a better relationship can lead to good communication (Jowett & Poczwardowski, 2007). This circular description makes it difficult to outline clear cause-and-effect relationships or specify hypotheses about the relationship between the constructs.

A second, more impactful limitation of the 3+1 C's model is the broad definition of the constructs. In general, the constructs of this model are not clearly operationalized. The dimensions are described in very broad terms, such as liking, respect or trust (for the closeness dimension). These terms, however, are in themselves very complex constructs, with in-depth definitions, conceptualizations and models.

Trust emerges only as a sub-construct of the closeness dimension and its individual influence is not specified within this model. The individual impact of trust on the relationship is not clear, as well as how this construct relates to other facets of the closeness dimension, e.g. liking or respect. A clear distinction between the two constructs is not possible. Equally, the model lacks a description or definition of good coach-athlete communication.

Hence, it becomes necessary to examine specific models. In order to formulate specific hypotheses about the role and impact of trust and communication, it is important to first clearly define these complex constructs, which will be the focus of the following chapters: In Chapter 3 models and concepts of trust will be described, defining trust and describing antecedents necessary for trust to build. In a next step, communication will be discussed, specifically digital communication and its impact on close relationship (Chapter 4).

3. Trust Research

The previous chapter highlights the importance of the coach-athlete relationship in general, as well as specific effects of trust in coach. However, as just discussed, Jowett's model of the coach-athlete relationship highlights the importance of trust without an in-depth definition and description of this construct. The following chapter provides an overview of different conceptualizations and definitions of trust, in order to gain a better understanding of this complex construct. The goal of this chapter is to first offer a general definition of trust and distinguish between trust and similar constructs (3.1.), before discussing different models of trust (3.2.) as well as describing the specific trust model used to derive the main research questions of this dissertation (3.3.) In a final step, the measurement and valid assessment of trust will be discussed (3.4.).

3.1. Describing the construct of trust

To begin with, a general definition of trust will be established, by discussing trust research from different fields, and finding a definition suitable to the context of the coach-athlete relationship. In addition to a general definition, it is vital to distinguish trust from similar constructs, in order to understand the role trust plays within the coach-athlete relationship, compared to similar constructs, such as reliance or faith. However, in a first step, definitions from various fields of research will be compared, before determining a definition suitable for the current research.

3.1.1. General Definitions of Trust

Overall, trust has been researched within a wide variety of fields, ranging from pilosophy (e.g. Hartmann, 2011; Pettit, 1995), Sociology (e.g. Lewis & Weigert, 1985; Luhmann 1979;), and psychology (e.g. Lewicki & Bunker, 1995; Mayer, Davis, & Schoorman, 1995), to communication sciences (e.g. Kohring, 2002), to name a few of the most prominent research fields. Due to this diverse access to the topic of trust, many conceptualizations and research models exist. Each of the many research fields examining trust has done so from its own perspective, often implementing its own, unique definition of the construct.

However, at their core, most conceptualizations and definitions share some aspects: Rousseau, Sitkin, Burt, and Cramer (1998) conducted an interdisciplinary literature review, in order find the core of trust's definition. They describe trust as a *psychological state,* which involves accepting *vulnerability to another* (i.e. the trustee), due to the *positive expectation* regarding their future behavior, based on *past experiences*. Across disciplines, trust becomes necessary, when a subject (i.e. the one who trusts, or trustor) interacts with another entity (i.e. the one who is trusted, or trustee), while being unable to control the actions of the other. These

core components are found in many definitions, regardless of discipline. Similar to the construct of being vulnerable to another, many trust definitions highlight the importance of risk, as without risk, trust would not be necessary (Lewicki & Bunker, 1996; Mayer, et al., 1995).

The current research adopts this broad definition of trust and applies it within the field of sports in general. While trust is an important construct within the sporting field, sport sciences and sport psychology have not developed their own definition (Meinberg, 2010). The definition by Rousseau and colleagues (1998) has been adopted to the sporting context before (Dreiskämper, 2014; Pöppel, 2015). For the current research, this definition is adopted as well, and applied to trust within the coach-athlete relationship. When an athlete works with a coach, risk is present: Within any context – competitive elite sports or a sport and exercise setting – a wrong training method or technique can have detrimental effects on an athlete's athletic development, training success and even health. Especially within the elite sports context, the risk is more pronounced, as the consequences of poor training, i.e. stagnation, injury, or athletic failure, are even greater. Thus, the athlete is vulnerable to their coach. Yet, if the athlete trusts their coach, they have a positive expectation that following the training regimen will lead to desirable outcome, and therefore they would engage in the trusting behaviors. Similarly, coach is vulnerable to the athlete, as the coach's success is dependent on the athlete's performance.

This general definition stems from an interdisciplinary review and focusses largely on the psychological and social nature of trust. In their conceptualization Lewicki and Bunker (1996) try to distinguish between three different conceptualizations, based on different research approaches and areas examining trust: They see trust to either be an *individual feature* when examining it from a personality perspective, an *expectation* when examining it from a social psychology perspective, or an *institutional phenomenon* when examining it from a sociological or economic perspective. Lewicki and Bunker's (1996) different conceptualizations have been addressed in other research as well.

Researchers who regard trust to be an *individual feature* generally either see trust as a disposition or a general tendency to trust (Das & Teng, 2004; Mayer et al., 1995). Mayer and colleagues (1995) describe propensity to trust as a stable factor within a person, influencing the probability one person will trust another. Similarly, Das and Teng (2004) discuss different conceptualizations of trust in their theoretical paper, relating trust propensity to the concept of risk. They conceptualize trust as an individual feature, a disposition to trust, closely related to, yet distinct from, a disposition to take risks: Trust propensity describes a person's general perception of uncertainty in relationships, while risk propensity describes a person's general way of dealing with that uncertainty. Luhmann (1979) also argues that a person's readiness to

trust depends on their nature and personality. This perspective strongly emphasizes individual differences in the general tendency to trust or mistrust, explaining why people in the same situation do not necessarily trust and behave in the same way.

When primarily considering trust to be an *expectation* (Lewicki & Bunker, 1996), researchers focus on its sociological role and impact on relationships. This perspective focuses on trust as an expectation of how others around us will act. It is only because of our expectation that others will not harm us that we engage in relationships with them. When we trust each other, we expect them to behave in a predictable way. Luhmann (1979) even goes so far as to argue that trust is the glue that holds our society together. Without trust, one would not be able to leave the house in the morning, without fear of being struck down by other members of society. Yet, we inherently trust that nothing bad will happen to us, i.e. we inherently expect others to behave in a non-threatening way. Within this setting, the social context becomes an especially important quality of trust: We trust in the social context of our interactions, i.e. in society, and are thus able to function in our everyday lives. When the social context changes, however, we no longer have certain expectations of how others will behave, and our trust in others will be reduced (Luhmann, 1979). Trust in society, as an expectation of how others will behave, reduces complexity in our everyday lives.

Thirdly, viewing trust as an *institutional phenomenon*, researchers conclude that trust does not only refer to interpersonal relationship, but rather is applicable to dyads, groups, collectives and institutions (Lewicki & Bunker, 1996; Lewis & Weigert, 1985). Lewicki and Bunker (1996) argue that it is necessary to extend the concept of trust to the relationships individuals hold not only with each other, but with institutions and organizations as well. Similarly, Lewis and Weigert (1985) discuss the function of trust from a sociological perspective, highlighting the importance of trust in societal institutions for the functioning of those institutions. Trust is also an important phenomenon within an organizational context, as it is important for people to trust organizations, as well as one organization to trust another. In his theoretical paper discussing the concepts of trustworthiness and trustfulness Tullberg (2008) argues that economic exchanges inherently include risk, and thus necessitate trust. Thus, societal, as well as economic uncertainties require us to trust in institutions and organization, in order for those institutions and organizations to function properly.

The previous paragraphs have shown how trust can be examined from various perspectives, with different definitions of what trust is. Besides these conceptualizations of trust, it is also important to differentiate trust from similar constructs, when defining it. The

following sections describe constructs similar to trust, and highlight how the constructs are related, yet distinct.

3.1.2. Distinguishing Trust from Similar Constructs

Trust and trustworthiness. The expectation of whether others will harm us or not is rooted in our assessment of the others' trustworthiness. Herein lies the important distinction between trust and trustworthiness. Trustworthiness is the expectation that someone will behave in a way that is not harmful. While trust includes the components of risk and vulnerability, as well as the actual act of trusting, i.e. trusting behaviors (Mayer et al., 1995). Just because the trustor perceives the trustee to be trustworthy, this does not mean the trustor will indeed trust them. If the risk is perceived as too high, the trustor will not engage in trusting behaviors (Mayer, et al., 1995). Trust requires risk and vulnerability, as previously shown. Trust and trustworthiness are distinct, yet related, in that trustworthiness is the characteristic of an individual encouraging others to decide to put their trust in them or not, depending on the perceived risk (Corritore, Kracher, & Wiedenbeck, 2003).

Trust and cooperation. Cooperation is often used as a synonym to trust, especially by game theorists (Deutsch, 1958). However, Mayer and colleagues (1995) argue that while trust and cooperation can often coincide, strictly speaking, cooperation does not require trust. Cooperation might occur under the absence of risk or vulnerability, and thus would not require trust. It can, however, also be the cause of trust, as people cooperating with each other under risky circumstance might start to trust each other, or it might be the results of trust, as people would start cooperating on the basis of trust (Mayer, et al., 1995).

Trust and faith. Trust and faith are often used interchangeably, especially in layman terms. Faith, however, is generally considered not be grounded in reason, meaning we have faith in something, without proof or reasonable information (Corritore, et al., 2003). While trust encompasses making a strategic decision about whether or not to take a risk, faith means taking a leap, without there being proof that faith will not be in vain (Corritore, et al., 2003; Macy & Skvoretz, 1998).

Trust and Reliance. Reliance is another construct with is related to, yet distinct from, trust. Reliance is generally understood as a rational choice to rely on another person, or else a (mental) state in which one needs another person or thing, in order to achieve a desired outcome (Railton, 2014). Furthermore, reliance is sometimes described as being void of emotional components, but being a rational decision (Mouzas, Henneberg, & Naudé, 2007). In this sense, trust is distinct from reliance, as it is more than just a state. It is a belief about the intentions or

behavior of someone else, and incorporates emotional components and trusting behaviors, i.e. risk-taking actions within relationships.

Trust and credibility. The relationship of credibility, trust and trustworthiness is one of the most complex and most difficult to distinguish relationships. Oftentimes, credibility and trustworthiness will be used interchangeably and synonymously: While Metzger and Flanagan (2013) define credibility as based on perceptions of trustworthiness in their research on heuristic evaluation of the credibility of online information, they nonetheless use the two terms interchangeably throughout their paper. Both credibility and trustworthiness are considered traits attributed to people or institutions (Bentele, 1988). Thus, credibility and trust, are definitely distinct constructs, in a similar fashion as trust and trustworthiness are distinct from each other. However, looking at research on these constructs, the distinction does not appear to be that simple. Additionally, distinguishing trustworthiness and credibility is no easy feat either. On the one hand, some researchers assume that trust is a prerequisite for credibility, i.e. one must trust in the information provided, in order to determine whether it is credible or not (Bentele, 1988). Thus, credibility would appear to be a consequence of trust. On the other hand, research states the exact opposite, namely that trust is the broader construct with credibility being an indicator of trustworthiness. Some researchers argue that credibility is a factor indicative of integrity, which is an antecedent to trust (Kohring, 2002). Hence, it becomes apparent that research has not reached a consensus on the relationship between trust, trustworthiness and credibility. What becomes clear, however, is that these constructs are closely related and that it is important for research to clearly define the constructs under scrutiny. As for the current research, the focus lies clearly on the constructs of trust and trustworthiness, with credibility not playing a central role.

Trust and mistrust. One last construct to be discussed as related to trust is the construct of mistrust. Here, as well, different understandings exist within current research: Guo, Lumineau, and Lewicki (2017) offer a recent overview, where they discuss the following conceptualizations. One the one hand, trust and mistrust are considered to be opposite ends of the same continuum, i.e. mistrust in the opposite of trust. When one has high trust, one automatically has no mistrust with regard to the same object. This is the most common understanding, which is also mirrored in everyday live (Guo, et al., 2017). While this understanding assumes that there will be either high or low degrees of trust or mistrust, a second conceptualization of the trust-mistrust relationship assumes a neutral state in the middle of the dimension: According to this conceptualization, low trust does not automatically imply the existence of mistrust, but rather a neutral, indifferent state. It is possible for a person to have

neither trusting, nor mistrusting feelings towards an object. The scale thus ranges from high levels of mistrust (and consequently no trust) to low levels of both mistrust and trust, to high levels of trust (and consequently no mistrust) (Guo, et al., 2017). The final understanding of this relationship assumes that both trust and mistrust are two separate and orthogonal dimensions. Thus, it is possible to have both high trust and high mistrust perceptions of the same object. The orthogonal nature of the relationship implies that four different constellations are possible: at the extreme points of the dimensions it would be possible to have both high trust and mistrust, both low trust and mistrust, high trust and low mistrust, or low trust and high mistrust (Guo, et al., 2017).

Applying trust and related constructs to the coach-athlete relationship. When examining trust within the coach-athlete relationship, it is worthwhile looking at these trust related constructs and delineating whether trust truly is the relevant construct. One might argue that for coach and athlete to work together, cooperation, faith or reliance might be the more relevant constructs. However, as seen previously, for cooperation and faith, risk does not need to be present. For an athlete working with a coach, however, risk indeed is present: The imbalance of power within the relationship, i.e. coach generally having more power over their athlete, means that the athlete is vulnerable to coach. There is a risk for the athlete that the coach may abuse their power, thus, cooperation and faith do not adequately describe the relationship. As for reliance, an athlete does rely on their coach, yet the relationship entails more than just reliance. This also becomes apparent when examining Jowett's 3+1 C's model (Jowett, 2007) and linking the currently discussed trust research back to the previously discussed model of the coach-athlete relationship: The relationship between coach and athlete is complex, encompassing cognitions, emotions and behaviors. Jowett's (2007) model includes all these aspects, allowing researchers to use the model when examining specific parts of the coach-athlete relationship. Thus, on a behavioral level (i.e. the Complementarity dimension), an athlete relies on their coach, and vice versa the coach relies on their athlete. The mutual interactions of coach and athlete are marked by reliance. However, beyond the behavioral component of reliance, trust is also important and included more specifically into the model within the Closeness dimension. This dimension encompasses feelings of liking between both coach and athlete and includes trust. An athlete trusting their coach will have positive beliefs about coach's behavior and intentions and engage in risk-taking behaviors. Thus, by applying the 3+1 C's model, there is a theoretical foundation for examining both reliance, or trust. The current research focuses on the construct of trust, as it is explicitly and directly mentioned in the model as an important predictor of a good relationship. Trust is one of the central aspects

of the closeness dimension and therefore appears to have the greater relevance, compared to reliance of similar constructs.

Mistrust within the coach-athlete relationship is also an interesting construct. Within the 3+1 C's model, mistrust might be placed at the space of trust, if the coach-athlete relationship is poor and coach and athlete do not share a lot of closeness. What happens, when trust between coach and athlete is broken and transitions into mistrust? Can trust and mistrust coexist within the coach-athlete relationship? How might trust repair occur within this relationship? While these are all important and relevant research questions, the focus of the current research lies on trust within the relationship. The research on trust within the coach-athlete relationship is currently still lacking. It is important to first understand the one side of the continuum (assuming trust and mistrust are two poles on one continuum), before examining the other end of the continuum. To examine both at the same time would exceed the scope of the current research.

Now that the construct of trust has been defined and, where possible, clearly distinguished from similar and related constructs, a second step will be to look at different types of trust, as well as various models and conceptualizations of the development and function of trust. The following chapters give an overview over some of the many models research has developed thus far, relates the models to one another and establishes which model will be used for the current research.

3.2. Models of Trust

Thus far, researchers in the field of trust have identified different types of trust. The various models describing these different types of trust distinguish whether they exist as sequential types of trust in a developmental model (e.g. initial trust and knowledge-based trust), co-exist as parallel types of trust (e.g. cognitive or affective trust), or else are distinct types of trust depending on the traits of the situation (slow trust or swift trust). The following table Table 1 gives an overview over the various conceptualizations and models of trust, differentiating between parallel, sequential or distinct stages within the development of trust, as well as depicting the specific different types of trust found in the models.

Table 1. *Overview of trust models, their specified types of trust, and whether the types of trust co-exist or are sequential stages within the development of trust.*

Source	Model	Developmental stages	Types of trust
Lewis and Weigert 1985	Trust as a Sociological concept	Parallel	Cognitive trust Emotional trust Behavioral trust
Shapiro, Sheppard, and Cheraskin 1992	The role of trust in business relationships	Sequential	Deterrence based trust Knowledge based trust Identification based trust
McAllister, 1995	The role of trust in interpersonal relationships in organizations	Parallel	Affective Trust Cognitive Trust
Mayer, Davis, and Schoorman, 1995	Integrative Model of trust		Cognitive trust
Lewicki and Bunker, 1995	Developmental model of trust in relationships	Sequential	Calculus based Trust Knowledge based trust Identification absed trust
Meyersson, Weik, and Cramer, 1996	Swift trust in temporary groups	Distinct	Slow trust Swift trust
McKnight, Cumming, Chervany, 1998	Initial trust formation in organizational relationships	Sequential	Initial Trust Knowledge based trust
McAllister, Lewicki, Chaturvedi, 2006	Trust in developing relationships	Sequential	Knowledge based trust Identification based trust Affect based trust
Lewicki and Wiethoff, 2000	Trust and conflict in relationships	Sequential	Calculus based trust Identification based trust
Wei and Yucetepe, 2013	Goodwill trust and competence trust	Parallel	Goodwill trust Competence trust

This table gives an overview over some of the most prominent research models and conceptualizations. As can be clearly seen from the table, many models share similar trust constructs, yet often present the constructs differently. The following paragraphs therefore explain the different models in more detail, highlighting the similarities and differences between the models.

3.2.1. Development of Trust Over Time

This first paragraph highlights the similarities and differences between those models of trust that propose a sequential development of different types of trust. At their core, these all share that they assume that within the development of a relationship, different types of trust exist. Yet they differ from one another when it comes to the specific type of trust and order of developmental stages.

Lewicki and Bunker (1995, 1996) propose a developmental model, differentiating between calculus-based trust, knowledge-based trust and identification-based trust. In their model, they propose those stages of trust to be sequential in nature, describing why people choose to trust one another, depending on length and quality of a relationship. This conceptualization is an adaption of Shapiro, Sheppard and Cheraskin's (1992) model, which also identifies three stages of trust development, yet with a different understanding of the first stage. Shapiro and colleagues speak of deterrence-based trust as the initial form of the model, rather than calculus-based trust. Shapiro and colleagues' model (1992) proposes that people initially choose to trust, because they assume others would deter from breaking trust. Their reasoning is that early on in a relationship the costs of losing the relationship outweigh the gains from exploiting the trust, and thus people choose to trust and behave trustworthily. Lewicki and Bunker (1995), on the other hand, see the first stage of trust to be calculus-based. Similar to deterrence-based trust, calculus-based trust is formed without any knowledge about the trustee. It is based on the calculation of the risks and benefits of the trustor keeping or breaking trust. Sztopmpka (1999) argues that humans interacting within the economic context would base their decision of whether to trust or not on a calculation of return on investment: The risks and benefits of trusting are balanced against the risks and benefits of not trusting. Within both Lewicki and Bunker's (1995), as well as Shapiro and colleagues' (1992) developmental model, the second phase is knowledge-based trust. The developmental models assume that as the two interaction partners get to know each other better, they implicitly gather more information about characteristics of the other, interaction experiences and communication behavior and can thus form a more detailed opinion about the other's trustworthiness (Lewickie, Tomlinson, & Gillespie, 2006). As the relationship progresses, the intention to trust each other is based on

knowledge the trustor has about the trustee. This is seen as a more advanced stage of trusting, as it is based on past interactions and knowledge about the other's behavior. Finally, the third development of trust is identification-based trust: In this case, the decision to trust is based on mutual respect, a close relationship and the identification with the trustee's desires and intentions. The decision to trust or not is based on an estimation of what will be mutually beneficial for both trustor and trustee.

In the course of his research, Lewicki changes and adapts this model several times, reducing the model to just two forms of trust, as well as changing the types of trust deemed most relevant. In 2006, Lewicki wrote a theoretical paper, reducing the three stages of developmental trust to only two, i.e. calculus-based trust and identification-based trust (Lewicki, 2006). In the same year, however, McAllister, Lewicki, and Chaturvedi (2006) published a paper as the result of an interdisciplinary review spanning three different fields of research. In this paper, McAllister and colleagues (2006) postulate three relevant trust distinctions: knowledge, identification-based trust, and a third, new distinction, i.e. affect-based trust. They exclude calculus-based trust believing it to be more mistrust than trust related.

Similar conceptualizations of trust have been developed by McKnight, Cummings and Chervany, (1998), as well as Meyersson, Weik, and Kramer (1996). McKnight and colleagues (1998) postulate a model of initial trust, based on the trustor's disposition to trust, i.e. his faith in general humanity, as well as his general trusting stance, as well as a second type of sequential trust, i.e. knowledge-based trust. Meyersson and colleagues (1996) differentiate between slow and swift trust. In this case, swift trust describes the trust formed within temporary working groups. Meyesson and colleagues (1996) assume that in temporary working teams, it is clear to everybody involved, that working together and trusting each other is beneficial to the group work. Thus, swift trust can be considered to be a form of calculus-based trust, because team members calculate the benefit of trusting, to out-way the harm through false trust (Jarvenpaa & Leidner, 1999). Slow trust, on the other hand, occurs over a longer period of time, within long-term working relationships (Meyersson et al., 1996), similar to knowledge-based trust.

Applying these constructs to the coach-athlete relationship, knowledge-based trust appears to be more important and relevant than initial trust. While initial, calculus-based trust is relevant when initially working together, the coach-athlete relationship typically lasts over a long period of time. As coach and athlete work together, their shared experiences and knowledge of each other replace the initial trust. Initial trust is only important when coach and athlete first engage in a new relationship. For both coach and athlete engaging in a new relationship, a calculation to trust the other appears likely. Even at this early stage, however,

knowledge of the other individuals involved, for instance of their reputation, will influence the decision and willingness to work together. The longer coach and athlete work together, the more important shared experience and knowledge about the other one become. Therefore, the current research will focus primarily on knowledge-based trust.

In conclusion, research on developmental stages of trust models has not reached an agreement on the different types of trust. Nonetheless, there appears to be consensus, that trust can be based on different perceptions, depending on the duration of the relationship between trustor and trustee. The commonality of all sequential models discussed thus far is the distinction between trust based on experience (i.e. knowledge-based trust, slow trust) and trust based on an initial interaction and the assumption that trusting behaviors would be mutually beneficial (i.e. initial trust, slow trust or calculus-based trust).

3.2.2. Types of Parallel Trust

Now that different developmental stages of trust have been presented, the following paragraphs focus on other types of trust. These models either assume different types of trust to co-exist within the same relationship, or else different types of distinct trust to exist, depending not on the stage of the relationship, but on other distinct factors.

The types of trust discussed thus far are all cognitive trust, based on rational calculations, knowledge and experience. However, this does not mean that the decision to trust or not to trust is always a conscious, cognitive one. When deciding whether or not to trust each other, people will rarely actively and consciously evaluate the risks and benefits of trusting versus not trusting. Rather, the decision whether to trust or not is more often done subconsciously or intuitively. Whether this subconscious decision rests upon a more cognitive input, or rather depends on other factors, has been discussed in previous research.

Lewis and Weigert (1985), for example, suggest differentiating between cognitive and emotional trust: Cognitive trust is based on rational reasons and is typical of the societal setting, applicable to large groups. Emotional trust, on the other hand, is typical for smaller, more close-knit groups and is based on positive feelings, similar to the previously mentioned affect-based trust conceptualized by McAllister and colleagues (2006). Drawing on Lewis and Weigert's (1985) conceptualization, McAllister (1995) develops a model of trust based on affective and cognitive trust. McAllister (1995) specifies that in order to assess a trustee's trustworthiness, both affective as well as cognitive sources are used. Thus, McAllister (1995) does not argue the existence of one type of trust over the other, but rather assumes that in any trusting relationship, both cognitive and affective trusting elements exist. Similarly, Corritore and colleagues (2003)

argue in a similar manor, saying the decision to trust or not is based on cognitive and rational reasons, as well as off of emotional and affective ones.

In a similar attempt to distinguish different types of trust, Wei and Yucetepe (2013) do not make a distinction between emotions and thoughts, but between goodwill trust and competence trust: The basis for goodwill trust in their model is the perceptions of the trustee's morality, as well as the positive expectation that the trustee cares about the trustor's interests. In this way, it is similar to affective trust, as it is based more on the perception of a positive relationship. Competence trust, on the other hand, refers to the confidence in the trustee's expertise and is therefore more related to cognitive trust. Competence trust is described by Wei and Yucetepe (2013) as the expectation that the trustee is capable to complete a given task, i.e. the trust in his or her abilities.

Applied to the coach-athlete relationship, an athlete might show either more goodwill trust, if they trust more in coach's morality and positive attitude towards them, or else show more competence trust, when trusting in his or her abilities to perform as a coach. Both types of trust appear to be applicable to the coach-athlete relationship, yet the constructs as such have not yet been applied to the sporting context. Therefore, it is unclear whether competence trust or goodwill trust dominate within this relationship, nor what their individual or combined impact on the overall relationship quality might be.

As for the application of affective or cognitive trust, both types of trust appear to be applicable as well. The coach-athlete relationship is a very personal and close one, thus the emotional trust described by Lewis and Weigert (1985), applicable in close-knit groups, appears to be relevant here. This is mirrored in the previously discussed model of the coach-athlete relationship, wherein closeness and personal liking are important for a high-quality relationship (Jowett, 2007). However, besides these affective aspects, cognitive cues are also relevant and important in Jowett's (2007) model. With regard to trust within the relationship, it is important to consider the cognitive, as well as the affective aspects, in order to capture all facets of trust within this relationship.

Summing up the thus far discussed aspects of trust, a few points will be highlighted here: Overall, depending on the duration of the relationship, knowledge, and experience, different cues can be used to judge the trustworthiness of the trustee. These cues might be based on a deep knowledge and understanding of each other, or else based on situational cues and a calculation of risk and benefits of trusting and not trusting. Furthermore, a distinction can be made between affective or cognitive cues. It is vital to understand the many different facets of this construct, in order to describe its impact within the coach-athlete relationship. Different

cues can become relevant to coach or athlete, depending on the stage of the relationship, as well as the emotional attachment.

The models mentioned thus far give an overview over different stages of trust, or whether affective or cognitive cues are relevant for the perception of trustworthiness. However, what is specifically assessed in order to determine the trustworthiness of the trustee has not yet been discussed. Therefore, the following paragraphs take a look at the antecedents of trustworthiness research has identified and examined thus far.

3.2.3. Antecedents of Trustworthiness

As early as the 1950s, scholars researching trust have tried to identify factors that lead people to trust. This line of research has looked to antecedents, i.e. factors immanent within a person or organization, to explain trusting decisions. Over the years, many different antecedents to trust have been identified. In one of the earliest works, Hovland, Janis, and Kelley (1953) describe two factors a trustor ascribes a trustee, when assessing his or her trustworthiness: For one, the expertise is assessed, for another the trustee's intention to lie. Hovland and colleagues (1953) examine trustworthiness within the context of a person's credibility and truthfulness. As such, the intention to lie plays an important role, yet has not been replicated much in trust research in other contexts. The second antecedent of expertise, on the other hand, has been examined in many other studies and contexts: Some studies call this antecedent ability (e.g. Deutsch, 1960; Mayer et al., 1995; Sitkin & Roth, 1993), while others describe it as expertness (e.g. Giffin, 1976) or competence (e.g. Kee & Knox, 1970; Liebermann, 1981). Yet at its core, this antecedent always describes a factor determining how capable the trustee is and to what extend he is able to perform as expected.

Apart from these very similar factors pertaining to a person's abilities and competence, other antecedents have been examined. Kee and Knox (1970), for example, additionally assess the trustee's motives in order to determine the trustworthiness, while Giffin (1976) sees personal attraction, reputation, dynamism, as well as intentions and reliability as an information source as important antecedents. The model proposed by Giffin (1976) is thus a far more complex model with many factors determining whether one decides to trust or not. Liebermann (1981) has a more conservative view: Besides competence, integrity is the only other antecedent. In this model, integrity describes the degree to which a trustee will keep their word and uphold moral standards (Liebermann, 1981). This is an important construct determining the trustworthiness: Besides *being able* to uphold an agreement (as with the antecedent competence), integrity addresses the question of whether or not the trustee is *willing to* uphold the agreement. Integrity is another antecedent which has been much researched over the years,

along with similar constructs, such as honesty: Ring and Van de Ven (1992) for example consider moral integrity and good will to be important antecedents, while Larzelere and Huston (1980) examine honesty and benevolence as important antecedents.

Benevolence is in fact another antecedent, which many researchers have looked towards: Solomon (1960) and Strickland (1958) see benevolence as the sole antecedent to trust. In their understandings, benevolence describes how the trustee feels towards the trustor. If the trustee is benevolent towards the trustor, he will be inclined to uphold an agreement.

Over the years, many different antecedents have been identified and many similar constructs were given different names. Some antecedents are examined only by individual researchers while other antecedents are examined by many different researchers. Mayer and colleagues (1995) discuss various antecedents and give a structured overview over the antecedents researched thus far. In their model they attempt to pool together the research and concentrate the trust antecedents as much as possible, in order to derive a comprehensive and economical model.

However, the reduction of trust antecedents is not the only advantages the Mayer and colleague's (1995) model has over other conceptualizations of trust. The model integrates existing knowledge on trust, while focusing on knowledge-based trust. It offers a unique starting point for examining the emergence of trust within close interpersonal relationships and is part of the foundation for the current research. Thus, the following chapter describes and discusses this model, explaining the emergence of trust through only three antecedents, as well as incorporating factors of risk, trustworthiness and trusting behaviors.

3.3. The Integrative Model of Trust

The integrative model of trust was developed by Mayer and colleagues in 1995. Their theoretical paper was published in the Academy of Management Review and originally addressed trust within organizational settings. It has since become one of the most influential papers in trust research. In their model, they define trust as a process between two individuals based on expectation and concerning a future action. This is in line with the previously discussed definitions of trust. The main advantages of this model are the fact that it distinguishes between trust, as well as trustworthiness and trusting behavior, incorporates a trait-like concept of propensity to trust, as well as situational factors such as risk, and reduces the antecedents of trust to only three, making it an economical model. This is an important advantage of the model. In their paper, Mayer and colleagues (1995) provide an overview of different antecedents of trust used in previous research, e.g. consistency, fairness or loyalty. They discuss each of the many possible other antecedents and describe how they are, in fact,

subsumed under the constructs of ability, benevolence and integrity. They discuss, for example, how fairness is in fact part of the construct of integrity: An integer person would behave in a fair manor. Thus, by reducing their model to only three antecedents, Mayer and colleagues have managed to produce a conservative and economical model of trust.

The model integrates many of the previously discussed concepts and constructs. It focuses mainly on cognitive based trust yet incorporates emotional aspects of trust in later versions (Schoorman, Mayer, & Davis, 2007): By stating that emotions influence the way trust antecedents are perceived, they incorporate a very important component. The conceptualization of trust used in this model is one of knowledge-based trust, as the trustor assesses three antecedents of trustworthiness, based on experience and knowledge about the trustee. However, the model also incorporates a sequential, developmental aspect: A feedback loop in the model allows for the re-assessment of trustworthiness, based on experience with the trustee, as well as the outcome of trusting behaviors. Another advantage of this trust conceptualization lies in the fact that the model has been previously adopted to the sporting context (highlighted in more detail in section 3.3.2.), making it easily applicable to the context of the coach-athlete relationship.

3.3.1. Central Aspects of the Model

The Mayer and colleagues' (1995) model of trust describes the development of trust as a process. Starting point of the model are the antecedents of perceived trustworthiness (see Figure 6). Through extensive literature review, they reduced the antecedents of trustworthiness to only three, postulating that those three antecedents cover all that are relevant. Including additional antecedents does not explain significantly more variance in trusting beliefs, while at the same time makes the model more complex and less economical. Perceived *ability* describes the extent to which the trustor perceives the trustee to be able to perform the task needed. The decision to trust is thus dependent on whether or not the trustee is generally capable of performing what is expected of them. The second antecedent, *benevolence*, describes whether the trustee is perceived as having the trustors best interest at heart. Even if they are generally capable of performing a task, the question still remains, if they are willing to do so. Thirdly, *integrity* describes the general perception of the trustee's ethical and moral beliefs. The trustor assesses elements such as fair play and just behavior. Even if the trustee is able to help and perceived as benevolent towards the trustor, the question remains whether they are likely to hold true to their word or not.

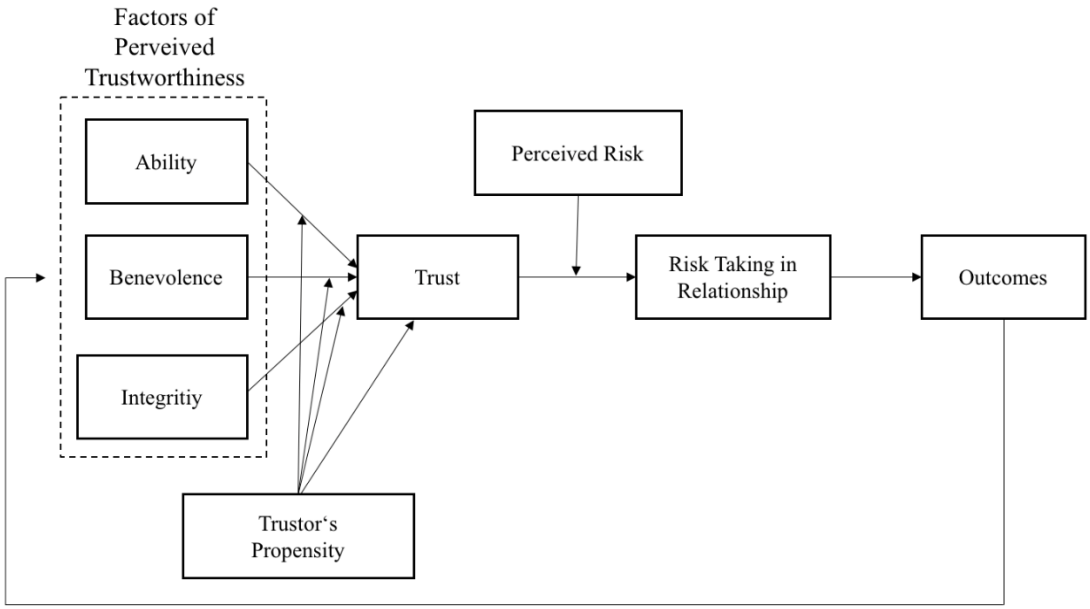

Figure 6. Integrative model of organizational trust.
Depiction by author based on Mayer and colleagues (1995)

All antecedents are judged specific to a situation. If, for example, athletes must judge their coach's trustworthiness, they will assess his or her ability to coach in a specific field of sports; they are not interested in a general assessment of the coach's ability. The coach's specific abilities in the sport, e.g. to convey a technique and general knowledge of physiology, are relevant for the question of whether or not to trust her. If, however, the athlete wanted to ride in the car with their coach and wanted to assess whether or not to trust their coach's driving skills, they would not assess coach's ability as a coach, but rather their ability to drive. Thus, the antecedents of trust are always perceived with regard to the task at hand.

All three antecedents are perceived individually from each other. Their joint impact determines the general perceived trustworthiness. Even though, the model does not specify how each antecedent impacts the overall trustworthiness, and a weighing of one antecedent against the other is not possible. Thus, it is possible for ability and benevolence to be perceived as high, while integrity is perceived as low. Although two out of three antecedents are given, it is still possible for the overall trustworthiness to be low. Here, however, the model lacks specific predictions as to the impact of each individual antecedent.

Besides the antecedents, the *individual propensity to trust* impacts the trust in the trustee. With this element, Mayer and colleagues (1995) integrate the individual disposition, an individual willingness to trust others. This varies across people and explains why people react differently with regard to trust in the same person.

The perceived trustworthiness, together with the propensity to trust determine whether a person decides to trust someone or not. This, however, does not mean that they will indeed act upon that trust. The next element of the model comes into play here: The *perceived risk*. Whether an individual engages in trusting behaviors or not, is dependent on the perceived risk. Even though an athlete might perceive their coach to be very trustworthy, and have a high general propensity to trust, they may still not engage in trusting behaviors, if the risk of injury through wrong training is perceived to be too high.

If, however, the risk is not perceived as high, the athlete will engage in *trusting behaviors*, the next element of the model. This is another advantage of the model, the differentiation between trust, and trusting behavior. The trusting behavior is the action taken due to trust. This could be, for example, that the athlete follows the coach's training regimen. This, in turn, leads to certain outcomes: This might be increased athletic performance and success. In that case, this would lead the athlete to reaffirm their prior perception of coach's ability, benevolence and integrity. If, however, the training leads to injury and poor performance, this would lead the athlete to, for example, reassess coach's ability.

The model was originally developed for the organizational context to describe trust of an employee in company management. Yet, the model is widely applicable, both to interpersonal relationships, as well as to trust in organizations. The model has previously been adapted to the sporting context, which will be discussed in the following chapter.

3.3.2. Adoption to the Sports Context

In general, trust has been researched only a little within the field of sports (Meinberg, 2010). In his article, Meinberg (2010) discusses the various fields in which trust has been researched in sports, and where research is still lacking. Much of the focus of trust research in sports is on trust in teams (e.g. Daley & Wolfson, 2010; Dirks, 2000), trust in coach, as previously discussed (Chapter 2), or else trust in anti-doping work and sport organizations (Dreiskämper, Pöppel, & Strauß, 2016). The research on trust within the coach-athlete relationship is, of course, of special interest. The research on trust within this context is sporadic, drawing on trust constructs from other fields, without assessing the general applicability of the construct to the field. Zhang and Chelladurai (2013), for example, applied the interpersonal trust model of Mayer and colleagues (1995) in part, adding a fourth antecedent, namely perceived justice. While they did find a significant impact of all four antecedents, the general applicability of the interpersonal trust model in its true form remains in question. Dirks (2000) implemented a single factor of trust in his research, based on McAllister's (1995) trust conceptualization and was able to show an effect of trust and a general

applicability. However, as an adapted version was used, the specific applicability of the trust model remains unclear. Similarly, Nikbin and colleagues (2014) examined trust and perceived justice within volleyball and futsal teams. For their conceptualization of trust, they use adapted questionnaires from organization contexts. In their discussion, Nikbin and colleagues (2014) argue for the importance of using sport specific models and questionnaires, and suggest future research to implement valid and reliable, sport specific measures.

Thus, Dreiskämper and colleagues (2016) assessed the applicability, validity and reliability of a trust measure, based on Mayer and colleagues' (1995) model of trust. They translated the questionnaire by Mayer and Davis (1999) and adapted it to the sporting context, for a wide range of situations: They assessed the perception by various groups of trustors (i.e. athletes, team members, fans), as well as the trustworthiness of various groups of trustees (i.e. athletes, coaches and organizations). Additionally, they reduced the five-scale measure of Mayer and Davis (1999) to only three scales, i.e. ability, benevolence and integrity due to poor internal consistency of the remaining two scales (Dreiskämper et al., 2016). By pooling several samples together, Dreiskämper and colleagues (2016) achieved a total sample of 744 participants and assessed the validity and reliability of the trust model and measures. Thus, they were able to show the interpersonal model of trust is applicable to the sporting context, and specifically to the coach-athlete relationship. Additionally to showing the applicability of the general model of trust, Dreiskämper and colleagues (2016) provide a valid and reliable questionnaire to assess perceived trustworthiness. This specific measure of trustworthiness was used as one of the main methods for the current research in order to examine the perception of coach's trustworthiness. Yet, in order to better understand the roots of this trustworthiness measure, the following chapter focuses on various measures of trust and trustworthiness. Different methods will be discussed, before highlighting the specific questionnaires in more detail, in order to provide a larger background and basis for the current research.

3.4. Measuring Trust

Now that different models, definitions and conceptualizations of trust have been discussed, the last question addressed in this chapter is the question of how to measure trust. This question is not a trivial one. Lewicki and Brinsfield (2012) describe the challenges of measuring trust in their book in a chapter on trusting beliefs and behaviors. They highlight the conceptual difficulties of measuring trust as it is a latent construct, which cannot be directly observed. Rather, other methods must be used, to either assess trust indirectly through actions and behavior, or through self-report in form of qualitative and quantitative methods (Lyon,

Möllering, & Saunders, 2012), which will be addressed respectively in the following paragraphs.

Qualitative methods of measuring trust. One approach to assessing trusting beliefs is through qualitative methods, such as interviews (e.g. Lyon, 2012; Saunders, 2012), case studies (e.g. Tillmar, 2012) or the critical incident technique (Münschner & Kühlmann, 2012). Especially interview based qualitative methods share common advantages as well as shortcomings: One main advantage of these methods is the minimal loss of information, as participants' answers are not constricted to a specific scale (Gremler, 2004). The open answer format provides the participant with more freedom to express implicit understanding, perception and mechanisms behind trusting decisions and behaviors. Additionally, qualitative interviews and content analysis are methods that are easily applicable to the coach-athlete context, as this method has been used within that area of research. However, interview studies and qualitative methods with small sample groups have disadvantages, as well: For one, interviews assessing trust within a specific context require the interviewed person to trust the interviewer enough to give honest answers. Thus, it is part of the challenge to ensure an environment fostering trust during the interview (Lyon, 2012). Another disadvantage of qualitative research can be seen in the smaller sample sizes. When sampling participants for trust research, different approaches of non-probability sampling can be implemented, i.e. typically either theory driven or adapted throughout the research process (Lyon, 2012). However, both methods do not fully avoid a sampling bias, thus making it difficult to infer mechanisms on a population basis. Especially when researching the coach-athlete relationship, the nested nature of the population (i.e. requiring multiple athletes per coach, as well as multiple different coaches) makes this especially challenging, and quantitative methods appear to be more beneficial to the research question.

Quantitative methods of measuring trust. Another general approach to measuring trust is through quantitative methods, assessing either self-report measures of trustworthiness, or else assessing trusting behaviors, for example through the prisoner's dilemma or other trust games (Lewicki & Brinsfield, 2012). Typically, trust games are some type of collaborative exercise, where one partner must work together with another in order to achieve mutually beneficial outcomes. They assess a participant's actual trusting behaviors in a laboratory setting. While trust games have been used frequently, especially within an organizational research setting (e.g. Camerer, 2003), their external validity has been questioned (Lewicki and Brinsfield, 2012).

Another way to quantify trusting beliefs is through *case vignettes*. This method offers the opportunity of assessing perceived trustworthiness in a situation where it might be difficult to

gain access to a specific population of trustors or trustees. In vignette studies, participants are asked to assess a hypothetical real-life situation. A general scenario is described and subsequently crucial information is varied, thus potentially influencing the participants' assessment and allowing the researcher to make assumptions about explanatory mechanisms (Barrera, Buskens, & Raub, 2012). For example, by systematically varying characteristics of an interaction partner (previous successful interactions vs. no previous interactions, possibility of sanctions in case of trust misuse, vs. no possible sanctions), Barrera and Buskens (2007) assessed if participants were willing to invest in a fictitious investment opportunity. In their study, they were able to gain insight over learning, imitation and control mechanisms with regard to trusting decisions. Similarly, Mayer and Norman (2004) varied cues in their vignette descriptions of an interaction partner, while assessing trustworthiness and willingness to be vulnerable. They found expected differences in perceived trustworthiness and thus demonstrate the applicability of case vignettes to manipulate perceived trustworthiness. Despite this potential, some limitations must be kept in mind: similar to trust games, case vignettes have questionable external validity, as people do not always behave the same way they indicate they might (Barrera, et al., 2012). Additionally, the case vignettes lack real-world consequences of decisions, as well as real world complexity (Barrera, et al., 2012). Nonetheless, vignettes are a viable possibility of gaining insight over complex trusting relationships and mechanisms.

Questionnaire measures. By far the most commonly used method for assessing trustworthiness are questionnaires. The result of this popularity of questionnaires is a plethora of different questionnaires and instruments. In 2011, McEvily and Tortoriello conducted a review assessing all published instruments used in measuring trust in an organizational setting, identifying 129 different instruments. One problem with the many, varying instruments is that not all of them clearly conceptualize whether trust or trustworthiness is being assessed (Dietz & DenHartog, 2006). In review of organizational trust research Dietz and DenHartog (2006) state that most questionnaires assess trustworthiness, rather than trust itself. This distinction is important, as rating trustworthiness alone does not give information about the actual trusting intentions, without information about willingness to take a risk (Mayer, et al., 1995). Thus, it is necessary to bear in mind that questionnaires assessing trustworthiness do not give any information about the existence of actual trust in a given situation.

Of the 129 trust instruments suitable for measuring trust or trustworthiness identified by McEvily and Tortoriello (2011), only 22 were used in multiple studies, and only three instruments provided information on psychometric properties, replication and validation: Mayer and Davis's (1999) instrument of perceived trustworthiness, McAllisters's (1995)

measure of cognitive and affective trust within managerial interpersonal relationships, as well as Cummings and Bromiley's (1996) organizational trust inventory.

The organizational trust inventory by Cummings and Bromiley (1996) contains twelve items on three scales, i.e. good-faith effort, honesty in exchange and limited opportunism, and was initially developed to assess trustworthiness within negotiations. The items were generated and cross validated by different expert groups. Finally, the questionnaire structure and validity was assessed using a sample of 323 university students, indicating good reliability. Due to its original design for negotiation situations, a general transfer to other contexts appears to be only minimally possible (McEvily & Tortiello, 2011).

McAllisters's (1995) measure of managerial trust contains eleven items on two scales, i.e. cognitive and affective trust. An initial items pool of 40 items was reduced to 20 items using expert ratings, and reduced additionally to the final eleven item pool using exploratory factor analysis to identify the strongest loading items. The psychometric properties of the final eleven items were then assessed using a new participant sample and the structure of the questionnaire was assessed using confirmatory factor analysis. McEvily and Tortiello (2011) highlight the thorough construction process of this measure, yet still criticize the wording of some of the final items.

Mayer and Davis's (1999) instrument of perceived trustworthiness contains 29 items on five scales reflecting perceived ability, benevolence and integrity, as well as propensity to trust and trust itself. Originally, the scales contained more items, which were subsequently reduced due to exploratory factor analysis and expert ratings. The final version of the questionnaire showed good reliability and validity. Even though McEvily and Tortoriello (2011) call into question if the Mayer and Davis (1999) scale can be transferred to other contexts, it has been successfully adapted to the sports context (Dreiskämper et al., 2016), as has been previously discussed. The measure by Dreiskämper and colleagues (2016) has shown good applicability to the sporting context, as well as good validity and reliability as a measurement instrument and will thus be used throughout the current research.

Overall, two methods for the assessment of trustworthiness of coach are most relevant for the current research. On the one hand, the assessment of trustworthiness through the scale by Dreiskämper and colleagues (2016) will be implemented in several studies. This measure has a firm theoretical and methodological base within the field of sports in general and the coach-athlete relationship specifically and thus allows access to athletes' perceptions of coach's trustworthiness. On the other hand, a vignette study will be used to examine the relationship between different trustees, as will be discussed in more detail later. The vignette approach

allows access to a complex and hitherto unexamined relationship between different trustees. Combining these different methods allows access to the topic of trust from different perspectives.

Now that the concept of trust has been defined in general, a model for the current research identified, as well as measurement methods discussed, the next chapter addresses the role of communication, the second previously identified important factor within the coach-athlete relationship. Interesting for the current research is not only communication in general, but the influence of digitization and digital contexts on communication, as well as for the development of trust. Thus far, the trust models discussed focus on direct interactions of trustor and trustee. However, the question arises how an increasingly digitized world influences the development of trust. Thus, the following chapter addresses the question of what exactly digitization refers to, and how this affects communication in general, and the development of trust specifically.

4. Trust and Communication in Digital Times

As previously discussed (Chapter 2), communication is crucial for the coach-athlete relationship. Communication bridges the gap between the two and is the main channel through which coach can convey their expert knowledge as well as their emotions towards their athlete. As such, communication also plays an important role in the development of trust. The communication and interaction coach and athlete share are the main channels coach has to convey their ability, benevolence and integrity towards the athlete, in short, the main channel through which to convey important antecedents of trustworthiness.

One survey of German top athletes has shown that the way in which coach and athlete communicate is changing, with e-mail communication being the second most used way for coach and athlete to communicate (Merz & Thiel, 2014). Besides e-mail, text messaging, social media and digital training platforms are new ways for coach and athlete to connect, exchange information and communicate. Especially the implementation of wearables, apps and digital platforms is an emerging trend, offering coach and athlete new opportunities to interact through a digital medium. Online training platforms offer coach the opportunity to upload training plans, monitor their athletes' progress and communicate with them across great distances. While the benefits of these technologies seem apparent (e.g. connecting coach and athlete across great distance), little research has examined how interpersonal relationships are built and maintained through digital communication within the coach-athlete relationship.

It is the goal of this chapter to examine how digitization and social media have changed the way we communicate, interact and build trust in general, in order to apply those findings to the coach-athlete relationship. Specifically, this chapter aims at answering the question of how the digital world differs from the physical, face-to-face world. In a first step the necessary terms need to be defined clearly: Often digitization, internet, digital media, web2.0 and social media are used interchangeably. In research, however, these terms describe different and distinct ideas or concepts (Kaplan & Haenlein, 2010). After defining the terms related to digitization (4.1.), a second step will be to examine and describe the special features of the digital communication context and social media (4.2.), before defining trust within the online context (4.3.) and discussing special antecedents of trust within digital contexts (4.4.).

4.1. Definitions of Digitization, Web 2.0 and Social Media

In its most basic form, the term *digitization* is defined as the technological process of converting analog information into zeros and ones and storing them on a medium (e.g. Chandler & Muday, 2011; Hess, 2016; Schröder, 2006). However, it is also possible to look at the term *digitization,* or *digital transformation,* as referring to a process of rapid societal change: In this

case, digitization is defined as an increased use of technologies involving the transformation, processing and dissemination of information. In short, digitization can be defined as an increased use of digital media by individuals, companies and society as a whole (Chandler & Munday, 2011; Pousttchi, 2017). Thus, the term digitization does not refer to a new form of saving and storing information, but rather a way of organizing, structuring, and connecting the information and making it readily available to a large number of people (Hamidian & Kraijo, 2013). The process of digitization has been closely related to technological advances and started with the beginning of the 20th century (Kaplan & Haenlein, 2010; Wagenbach, 2012). Specifically, the development of the internet, digital storing of information and digital media can be held responsible for the advancement of digitization in today's society (Chandler & Munday, 2011; Pousttchi, 2017).

Going beyond the definition of the term *digitization*, research and theory have identified some fundamental effects the process has had on society. As a process, digitization takes hold on three levels: individuals showing an increased use of a technology, organizations and companies using technologies to increase their effectiveness and efficiency, and society as a whole, showing structural changes through new forms of participation (Hess, 2016). As such, digitization has influenced the sporting context as well: Within the coach-athlete relationship digitization has shown an impact on the individual level: Both coach and athlete increasingly use technologies, for documentation and tracking of athletic development, as well as for communication with each other. On an organizational level, digitization can influence the structure of sport teams and clubs, by enhancing their effectiveness through the implementation of those training technologies.

Besides the impact of digitization on those three levels, the process has also changed the way information is disseminated and communicated on a temporal, spatial and social level (Krotz, 2012). The speed of communication has increased dramatically (e.g. Ball, 2014; Rosa, 2013). This has led to a changed perception of time and space (e.g. Holtgrewe, 2014; Pernice, 2013; Peters, 2012). The speed of communication does no longer adhere to the restraints of physical transport through space. Rather, digitization allows the content of communication to be transported via internet and can reach its intended recipient within seconds. These changes have caused the world to seemingly grow smaller, enabling a global connection through the internet (Pernice, 2013; Rosa, 2013). The dissemination and consumption of information are not tied to a specific time, or date, but can be accessed readily whenever one wishes. Communication is independent of time as well. Both synchronous as well as asynchronous

communication is possible through chat or video-conferencing, as well as through mail or messaging services respectively (McFarland & Ployhardt, 2015).

These changes have, as Lundby (2009) argues, had a profound impact on society and its culture. However, digitization must also be considered as an ongoing process of change, with new technological developments emerging, influencing, and changing society as they do. While rapid change is a sign of a modern society, the broad availability of information through digitization has caused the speed of change to increase even more (Hamidian & Kraijo, 2013). When looking at some of the developments through digitization, there are some specific changes that have influenced and changed daily life. The constructs of web 2.0 and social media are emerging changes within the process of digitization that will be discussed next.

Web 2.0 focuses on the participation of users when it comes to developing and shaping the content found on the internet (Lackes & Siepermann, 2016). It can be seen as the next stage in the evolution of the internet, after web1.0. The information found online is no longer only decided by the website providers as in the early days of web1.0, but relies on the input, modification and correction through users (Lackes & Siepermann, 2016). While there is no clear technological advance that was necessary for web 2.0 to develop, the increase of broadband width, internet speed and access, has made multi-media online content more easily accessible and thus at least expedited the development of web 2.0 (Hamidian & Kraijo, 2013; Kaplan & Haenlein, 2010).

In its broadest definition, the term *user generated content (UGC)*, refers to any material produced by the consumers of a medium, including amateur footage used in news coverage (Chandler & Munday, 2011). More specifically, it refers to the sum of all the ways web 2.0 can be and is used (Kaplan & Haenlein, 2010). Three factors are important, when describing UGC: the content must be published on a publicly accessible website, creative effort must be involved and it must be generated by a non-professional (Chandler & Munday, 2011; Kaplan & Haenlein, 2010).

Finally, *Social Media* can be defined as "a group of internet-based applications that build on the ideological and technological foundations of Web 2.0, and that allow the creation and exchange of User Generated Content." (Kaplan & Haenlein, 2010, p61). This includes any types of application available through the internet, that allow connection, communication, knowledge sharing and cooperation of various groups, consisting both of strangers and people who previously know each other. These individuals might be globally dispersed or in the same physical place (Chandler, & Munday, 2011; Elefant, 2011). Social media are digital platforms, because they exist solely on the internet, or on devices capable of accessing the internet (e.g.

cell phones; McFarland & Ployhardt, 2015). Web 2.0 can be seen as the technological platform, necessary for the development of social media (Steiglitz, 2016).

Social media platforms can be split up in different categories or types: For one, *social networking sites*, such as facebook or linkedIn , allow users to create their own profiles (either public or at least semi-public), connect with lists of others users, and communicate with the users on this list. Another type of social media are *media sharing* sites, such as youtube for videos, or flicker for pictures. Furthermore, *wikis* allow a collaborative knowledge development, while RSS feeds allow the compilation and organization of content (Greenhow, 2010; McFarland & Ployhardt, 2015).

Returning to the sporting context, specifically to the coach-athlete relationship, it becomes apparent that digitization as a process, the existence of web 2.0 and social media have influenced this domain as well. The free availability and easy dissemination of information on training techniques and technologies allow more and more athletes and coaches access to expert knowledge. The sporting world has seemingly grown smaller, connecting coaches with athletes, despite great distances through digital technologies and online training platforms. The previously discussed definition of social media can be applied to such online training platforms: Typically, training platforms contain shared domains, in which a coach can connect with a list of athletes, while the athletes can connect with each other, too. Additionally, private accounts and private communication are possible, where coach can communicate with only one athlete. Both coach and athlete are able to post content, for example exchanging information on a training program, competition, physical development or progress with regard to learning a new technique. Apart from the use of such sport-specific social media and training platforms, other forms of digital communication are used within the coach-athlete relationship, e.g. communication via app or e-mail.

Overall, it becomes apparent that digitization as a process has had a profound impact on society as a whole, but also on each individual, influencing routines and behaviors in everyday life, as well as within an athletic context. As the digital realm offers new possibilities to connect and communicate, it becomes important to take a look at this new digital world and the rules that apply to it. The following paragraph takes a look at the digital context and examines in which way it differs from traditional face to face interactions, and where similarities lie. It is imperative to understand communication and interaction within this digital setting in general, in order to apply those findings to the coach-athlete relationship.

4.2. Describing Digital Communication and Social Media

Research suggests that the context of digital communication and communication through social media are distinctly different from the typical face to face context. The following sections take a closer look at this specific context, as well as at social media theories of digital communication. The goal is to better understand the digital context and its influence on communication.

4.2.1. Comparing Digital and Face to Face Communication Situations

In general, communication can occur within a wide range of situations, e.g. face to face conversations, phone calls, text messaging, video chatting, social media instant messaging or e-mails. In order to clearly describe the context of an interaction and its discrete ambient stimuli, McFarland and Ployhardt (2015) conducted an extensive review of literature from psychological, organizational, communication science, IT, computer sciences and educational research. Their goal was to develop a framework with which to describe any social interaction situation. They suggest a continuum ranging from a face to face communication situation, over mediated communication through telephone, e-mail or text messaging to social media and social networking on the other end of the continuum. Figure 7 shows the different points on this continuum, along with the discrete ambient stimuli describing different communication situations.

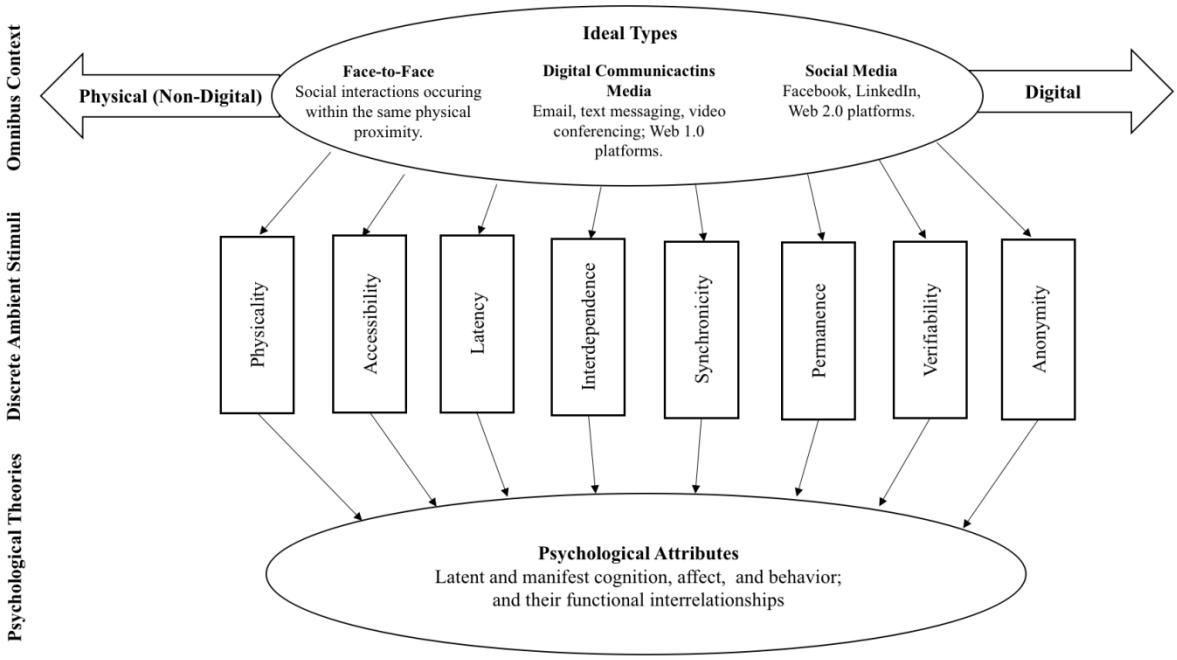

Figure 7. Discrete ambient stimuli describing the context of communication situations. Figure by author, based on McFarland and Ployhart (2015)

The *physicality* of social media is purely digital, whereas communication partners within a face to face setting share the same physical space and are tangible to all the senses, an important factor within media richness theory, which will be discussed later. Social media can be considered to be more *accessible*, that is it offers more opportunity for users to join a network and form relationships whereas the face to face context is less accessible due to restraints of physical access. The posting and spreading of content on social media is nearly instant, with a shorter *latency* than within a face to face context. With regard to *interdependence,* the face to face context shows fewer opportunities to share information, while social media offers better opportunities to share and connect with a larger number of people. While communication within a face to face context can only be *synchronous*, the social media context and related chat functions offer equal opportunity for both asynchronous as well as synchronous communication. Content within the face to face context is less *permanent*, while postings within the context of social media appear to be permanent, as they can be found on the internet for a very long time after posting. Information posted within the context of social media can be more easily cross-examined by others and is therefore more *verifiable* than content within the face to face context. Lastly, the *anonymity* is greater within the social media context. Digitally mediated technology lies somewhere in the middle on this continuum, for each of those stimuli. McFarland and Ployhardt (2015) suggest using these ambient stimuli to describe any given communication situation and to thus be able to classify the situation on the continuum.

Applying these stimuli to the coach-athlete relationship, it is possible to describe the different communication situations arising. Within the traditional coach-athlete interaction, we have a mostly face to face context, i.e. the coach and athlete share the same physical space during practice sessions, with coach giving direct, synchronous feedback. Coach has access to only a smaller number of athletes, yet has direct contact to each athlete. Implementing newer technologies and social media, a digital training platform allows coach to access more athletes and achieve a higher interdependence with them, while at the same time the communication situation is more anonymous. Furthermore, coach and athlete do not share the same physical space, but might be separated by a great distance.

McFarland and Ployhardt (2015) draw on social psychology research, stating that the context of a communication situation influences the way we perceive and process information, and thus has an impact on our thoughts, emotions and behaviors. However, the framework described does not specify how the different situations impact on the development of close relationships. The model states that sharing the same physical space and degree of interdependence, for example, influence the perception of a communication partner, yet does

not specific in what way the context impacts the perception of the communication partner. In order to look at the impact digital communication has, two prevalent social media theories will be discussed next, i.e. social presence theory and media richness theory (Kaplan & Haenlein, 2010).

4.2.2. Describing Digital Interactions Through Social Presence and Media Richness

Social Presence Theory. The social psychologists Short, Williams, and Christie (1976) were the first to introduce the idea of social presence theory: They state that media differ in their degree of social presence – defined as the acoustic, visual, and physical contact - that can be achieved between two communication partners. Social presence describes the salience of the other person in the interaction, as well as the salience of the interpersonal relationship. Depending on the degree of social presence perceived in a given situation, the personal desire for self-disclosure varies, i.e. the more social presence is perceived, the more willing a person will feel do disclose personal information. The degree of social presence can be varied through self-presentation through the medium.

Face to face communication is characteristic of a very high social presence, whereas digitally mediated communication, or paper and pencil communication show lower degrees of social presence (Short et al., 1976; Williams, 1977). Social presence is influenced by two factors: the perceived intimacy as well as the immediacy (Kapplan & Haenlein, 2010). The theory suggests that social presence is lower for mediated communication (e.g. telephone, e-mail, chat,) than for interpersonal communication. It is also lower for asynchronous (e.g. e-mail) than synchronous (e.g. video chat) communication.

Studies have since tested this theory and examined the impact of social presence on the choice of communication medium used. Straub and Karahana (1998), for example, examined which medium of communication workers with high information content chose when attempting to distribute their information to colleagues. With two separate samples of fortune 500 company employees, they found that social presence was a good predictor: The medium chosen for communication by study participants matched the social presence required by a task. In another study, the impact of perceived social presence as well as group size on group communication were analyzed (Lowry, Roberts, Romano, Cheney, & Hightower, 2006). In their sample of 439 university students, the researchers found that increased social presence led to better discussion quality in groups of three to six team members. These studies show that employees are aware of social presence. When a task demands higher social presence, employees will choose a communication medium that allows more social presence, e.g. face to

face communication. On the other hand, if the communication channel is predetermined, research suggests that higher social presence can lead to better outcomes for complex tasks.

Applying this theory to the coach-athlete communication, face to face communication between coach and athlete would elicit a higher sense of social presence, thus facilitating more self-disclosure and deepening the relationship. Communication mediated through technology, for example a digital training platform, on the other hand, would lead to less social presence. Thus, social presence theory would suggest that this form of communication leads to a slower development of the relationship between coach and athlete. This relationship, however, has not yet been empirically tested. Furthermore, the theoretically predicted lower social presence is not necessarily good or bad. Rather, the theory suggests the communication channel must match the degree of social presence required: When coach and athlete communicate solely about training programs, techniques or objective data, digital communication might well be even better suited than face to face communication. The new training technologies allow large amounts of objective data to be conveyed and little social presence is necessary for coach to convey objective and unambiguous training data. If, however, coach and athlete have a conflict or need to communicate emotions, then a higher degree of social presence might be advantageous. Yet, these theories remain untested within the coach-athlete relationship.

Besides social presence, another important difference between communication situations is the richness of the communication medium, as described by media richness theory. The following paragraph takes a closer look this theory and how it affects interpersonal communication and relationship building.

Media Richness Theory. This theory was first developed by Daft and Lengel (1986), who used this theory to describe the ability of a communication medium to communicate unambiguous information. Their intention was to present a framework with which to explain how information is organized and communicated within organizations. They proposed that communication media vary in their ability to process rich information. The most important aspects of rich media are the ability for instant feedback, the interpretation of non-verbal communication cues, as well as language variety. Richer media allow for more information and cues to be transported and are thus suitable for communicating complex information and resolving conflicts and issues. Media of low richness, on the other hand, produce fewer cues and restrict feedback, yet are good for communicating well understood messages and standard data. However, they are less appropriate when dealing with ambiguous situations or resolving conflict. Daft and Lengel (1986) suggest that face to face communication is the richest, whereas letters, memos or impersonal written documents and numeric documents are less rich. While

the richness of the medium is important, it is also important that there is a perceived fitting between the characteristics of the medium (i.e. the richness) and the characteristics of the task.

Various studies have tried to test this theory and its application. Using structural equation modeling, Chao Chang, and Chang (2014) examined the influence media richness and perceived uncertainty had on the intention to participate in the online social network Facebook. Collecting a sample of 370 participants, they found that media richness did have an impact on intention to participate in the social network: the richer the communication could be, the more likely participants were to participate and share content on Facebook. Other research has implemented media richness within the context of e-commerce. Brunelle and Lapierre (2008) for example tested whether perceived media richness could predict the intention to purchase something. from an online store. An online survey with 749 participants revealed that the perceived media richness of the online store could indeed predict consumers' intention to buy.

Besides social media and e-commerce, media richness has also been examined within a business setting, assessing speed and quality of cognitive and value driven tasks. In one experiment, 91 participants communicated either through video chat, instant messaging, telephone or face to face, while solving either a cognitive task with a clear correct solution, or a value-based task without an objective right solution (Valacich, Mennecke, Wachter, & Wheeler, 1994). They found support for media richness theory, in that face-to-face communication was perceived as being richest and yielded the best perceived performance for both the cognitive and value-based task. Regarding actual quality of performance, no differences were found with regard either to an objective right, or speedy solution to the task.

However, some studies have not been able to support the main assumptions of media richness theory: Dennis and Kinney (1998) conducted an experiment in which tasks of varying ambiguity were to be performed, while immediacy of feedback (i.e. synchronous or asynchronous communication) and media richness (i.e. communication through audio and video, or merely text chatting) were also manipulated. The results of the study indicate that participants did perceive the video communication to be richer. This did, however, not have an impact on the quality of decisions made. Some studies suggest that being used to using a communication medium influences how much impact media richness has: Burke, Aytes, Chidambaram, and Johnson (1999) examined this hypothesis with a sample of 80 participants, instructed to collaborate on a policy writing exercise, while communicating either via audio or video chat. In their study, they monitored team performance, as well as perceived media richness over the course of four appointments. The impact which perceived media richness had

on task performance became less prominent over time, leading the researchers to suggest that the importance of media richness decreases as subjects become accustomed to using a medium.

Media richness theory applied to the coach-athlete communication, thus, suggests that digital training platforms, enabling poorer communication, are well equipped for communicating objective training data and direct, unambiguous information on training and athletic development. Communication regarding the coach-athlete relationship, emotional topics and conflicts, would, according to media richness theory, be better communicated directly face-to-face through richer media. Communication relying too heavily on digital communication, or communication through digital training platforms would be detrimental for the important affective and emotional aspects of the coach-athlete relationship.

Linking Social Presence and Media Richness. In their study, Aljukhadar, Senecal and Ouellette (2010) conducted an experiment with 423 participants and examined the influence the media richness of a privacy disclosure statement (presented either as audio, visual, or text only) had on the intent to purchase from an online store. They found, that media richness influenced perceived social presence, and thus led to more trust in the online store. This was not the only study to link social presence and media richness theory. The two theories are often considered to be closely interrelated (Kapplan & Haenlein, 2010) and their joint influence has been examined in research.

In a laboratory experiment with 56 subjects, audio versus visual chat was tested against each other in two experimental conditions, while assessing perceived social presence, trust and enjoyment (Walter, Katschewitz, Köffer, Ortbach, & Niehaves, 2014). The findings suggest that media richness and social presence are two distinct aspects of the digital interaction, as richer media (i.e. verbal and visual communication, as opposed to merely text communication) was not associated with higher social presence.

The theories discussed thus far highlight the uniqueness of digital interactions compared to face-to-face interactions. They give some insight into how partners communicate and cooperate depending on task demand and communication medium, yet they do not answer the question of how trust is developed through digital communication. In fact, a first important question to address is whether online trust even differs from offline trust. Therefore, the following chapter aims to define trust within the digital context.

4.3. Defining Trust within the Online Environment

4.3.1. The Importance of Trust Online

As discussed previously, social context is an important characteristic of trust (Luhmann, 1979), and social media and digital interactions offer a special social context with unique

characteristics. Therefore, it is necessary to specifically look at how trust can emerge within this new context. Yet, some researchers have argued that online social interactions do not fulfill the minimal requirements for trust to emerge. They argue that the online context lacks necessary requirements, e.g. the certainty of the trustee's identity or a certainty of consequences (reward or punishment) of actions taken online (Nissenbaum, 2001; Turilli, Vaccaro & Taddeo, 2010). Equally, Pettit (2004) argues that online anonymity is a barrier to the development of trust, as people can act with impunity, without fear of ill consequences. Hence, this line of research argues that the social context of digital interactions does not elicit trust. The complexity reduction trust offers within our face to face social interactions is not given in the online environment. Yet, this would mean that online interactions are hardly possible or else allways riddled with uncertainty.

Therefore, others argue that these uncertain factors are precisely the reason why online trust is so important. The internet, per se, is unpredictable in nature, breeding environmental uncertainties and thus spawning risk (Pavlou, 2003). As seen previously, risk as an important component and necessary requirement for trust to emerge. Therefore, trust as the willingness to be vulnerable to someone, emerges as an important construct in the online world, just as it does in the offline. Jarvenpaa, Cantu, and Lim (2017) argue in their book chapter on trust in virtual environments that trust prevails in environments where interdependencies and vulnerability exist. They further argue that privacy concerns and lack of certain identification on the internet facilitate interdependency and vulnerability. In their theoretical discussion of distance, technology and virtual collaboration, Olson and Olson (2000) argue that despite technological advances, distance and cultural differences associated with living in different areas are still important factors hindering social interactions. They emphasize the importance of trust to enable social interactions. Similarly, Yamagishi and Kikuchi (1999) argue in their theoretical paper that trust is an important factor enabling social interactions to take place within the online context. Corritore, and colleagues (2003, p.738) state that "without trust, it is conceivable that a robust, interactive on-line environment would not be possible, just as it would not be in the offline world."

However, some researchers argue that while trust might be a necessity online, this does not mean that trust is developed though online interactions. Early research in this area states that "trust needs touch", indicating that trust must initially develop through face to face interactions (Handy, 1995, p. 46). In his review, Handy (1995) states that there are several "cardinal rules" for the development of trust. Among these rules, he states that personal, face to face interactions and opportunity for bonding are important for building trust. Similarly,

(early) trust experiments implemented the Prisoner's Dilemma and assessed whether people would engage in trusting behaviors, or defect and maximize personal gain at the coast of their partners' gain. Rocco (1998) found that people interacting face to face with their partner were more likely to show trust, and thus cooperative behaviors, while partners only interacting via text chat were more like to look for personal benefit rather than trust their partner.

In a similar experiment, Jensen, Farnham, Drucker, and Kollock (2000) implemented a social dilemma paradigm to examine trusting and cooperative behaviors mediated either through no speech, text-chat, text to speech, or voice chat. In their sample of 90 adults, Jensen and colleagues (2000) also found that trust was lowest for the conditions of no communication, or text chat. However, the voice chat condition did lead to trusting and cooperative behaviors in the Prisoner's Dilemma. Thus, Jensen and colleagues (2000) were able to show that even without personal face-to-face interaction trust emerged, albeit to a lesser extent. Similarly, Rocco, Finholt, Hofer, and Herbsleb (2000) conducted an online survey of virtual team members of a company operating both in Germany and England. They identified varying levels of trust for local versus distant team members, indicating that trust developed more slowly for distant team members, than it did for local team members. They interpret these results as showing that trust mediated through digital communication develops differently from face to face trust. Thus, it is possible for some form of trust to emerge between participants digitally interacting with each other.

4.3.2. Definition of Interpersonal Trust in Digital Environments

Accepting that trust can indeed emerge within the online context, the question arises of how to define trust within this context, before looking at antecedents of online trust. Online trust is defined by Shankar, Urban and Sultan (2002) as a situation of online economic exchanges. In this case trust is viewed as a firm's stakeholders relying on the company, with regard to the firm's business activities in the electronic medium, and in particular its website. A broader definition by Corritore and colleagues (2003), defines online trust as a confident expectation, that one's vulnerabilities will not be exploited, within the context of an online, risky situation. This second definition is applicable to a wide range of online situations, from e-commerce to the social internet. This second, broader definition is also applicable to a range of trustees, online trust referring to both the trust in the internet as a technology, as well as trust in another human being, or group of beings (i.e. a company) within the online context. It is important for researchers to make a clear distinction of which trustee they examine. Unfortunately, this distinction is not always clearly made, and in research thus far, "online trust"

has been used both to refer to trust in the internet as a technology, as well as interpersonal trust or institutional trust within the online, digital context (Corritore, et al., 2003).

In the following, the two forms of "online trust" will be considered as distinct constructs and defined and discussed separately from each other. Research has shown that trust should always be considered object specific and can vary from trustee to trustee, as well as from one situation to another. Thus, the distinction between trust in the internet and digital technology, as well as interpersonal or institutional trust within a digital context is important. Specifically, for the context of this research and the coach-athlete relationship, this is an important distinction: Trust in the internet and digital technology refers to trust in the training technology, app, wearable or online platform used to communicate, while interpersonal trust refers to the trust in coach, mediated through technology. Trust in the internet, as well as trust in technology, will be discussed separately in the following chapter (Chapter 5), while the further discussion in this chapter will focus on interpersonal and institutional trust within the online, digital context. Using the definition of Corritore and colleagues (2003) as a starting point, interpersonal and institutional trust within the online context will be defined as the willingness to be vulnerable to another human interaction partner or group or collective of interaction partner, while interacting within an online, digital context, as well as the confident expectation that this vulnerability will not be exploited.

As such, the definition of trust within the digital context is very similar to the broad definition of trust identified in chapter 3. Yet, through the specific addition of the digital context, it also becomes clear that in some ways it also differs from trust in face to face situations. Therefore the following chapter will focus on examining the special antecedents and special features of trust within this digital context

4.4. Antecedents of Interpersonal and Institutional Trust in Digital Environments

Corritore and colleagues (2003) argue that a large number of studies on offline trust are applicable to trust within the online context. For example, in their conceptual paper, they show that gender differences, i.e. that women tend to trust more than men, are replicable online as well as offline. Furthermore, they argue that the distinction between swift trust and slow trust as identified in chapter 3 is applicable to the concept of trust within the digital context. Additionally, Corritore and colleagues (2003) argue that many of the antecedents of trust offline are applicable online as well. However, apart from the similar antecedents of trust, the way in which the antecedents are perceived differs, and research has also examined specific factors important for developing trust within the digital context. This research has focused on examining trust within varying digital contexts, (e.g. virtual team work, e-commerce or the

social internet) or else through different theories of digital interactions (e.g. social presence or media richness). Jarvenpaa and colleagues (2017) offer an overview of research on digital trust antecedents in various research areas. The following paragraphs highlight some of this research, discussing specific antecedents of trust within the digital context.

4.4.1. Trust Antecedents in E-Commerece

Much of the research on trust within the online context has focused on trust within a context of e-commerce. Research in this area focuses on answering the question how online service providers, e.g. online stores, can reduce the perception of risk, increase customer trust in the supplier and thus increase the number of shoppers and revenue through online commerce. However, research in this area has not always clearly distinguished between trust in online vendors (i.e. people and thus interpersonal trust) and trust in the online store, the technology or the internet in general (i.e. a technology and thus trust in technology).

For example. McKnight, Choudhury, and Kacmar (2002a) examine the perception of the trust antecedents ability, benevolence and integrity in the online vendor. In their study they propose a multidisciplinary, multidimensional model of trust, integrating disposition to trust, institution-based trust, trusting beliefs and trusting intentions. In their work, McKnight and colleagues (2002a) defined their trusting beliefs based on literature review, coming to the conclusion that competence, benevolence and integrity were the most used beliefs. In a multi-step approach implementing principal component analysis, confirmatory factor analysis and analysis of a second order model, the researchers conclude the viability of their proposed model, finding value for the measurement of trusting beliefs in the online store through the constructs competence, benevolence and integrity. Yet, it remains unclear whether this is, in fact, interpersonal trust, or else trust in an institution, the internet or a specific technology.

Similarly, Jarvenpaa, Tractinsky and Vitale (2000) examine trust in an online store. In their study, however, they examine trust in the store itself, thus examining trust in the intuition and more clearly defining what they are addressing. They conducted an online survey experiment with 184 undergraduate and MBA computer science and information systems students. Their task was to complete several online shopping transactions, while choosing from a range of different online stores. They found that, among other things, the reputation of the store influenced the perception of trustworthiness. This was applied to both online book stores and online travel providers, and showed that a more positive reputation was associated with more trust. Similarly, Pavlou and Dimoka (2006) conducted a content analysis of feedback text comments of 420 buyer-seller pairs on e-bay, in order to assess the impact of reputation on trust. They found that the text-based reputation systems had an impact on the perception of a

seller's benevolence and credibility, thus impacting trust. Equally, Pettit (1995) underlines the importance of reputation systems due to the uncertainties inherent in online interactions. He emphasizes that online interaction systems must allow users to develop reputations, in order for trust to emerge. If the interaction system does not allow this, trust will not be possible.

Over the course of research, many other factors fostering trust online have been identified. Li, Pieńkowski, Van Moorsel and Smith (2012) conducted systematic review and presented a holistic framework of trust antecedents within the online context. Among those factors identified were third party safe guards, reputation systems and security policies. In their article published in the Harvard Business Journal, Reichheld and Schefter (2000) discuss various examples of companies utilizing safeguards and security features in order to increase customer trust and thus loyalty.

Additional factors identified by Li and colleagues (2012) include web design, navigation and presentation of sellers. Similarly, Nickel (2015) addresses the question of trust through design in his review of numerous case studies. Distinguishing between trust in technology and digitally mediated interpersonal trust, he identifies design elements such as making reputational information available (e.g. ranking or feedback systems), collaborative work-support systems providing contextual information, and user identity mediation as important design elements for digitally mediated interpersonal trust.

Research has also looked at communication strategies companies can implement through web sites to foster trust. Calefato, Lanubile, and Noviell (2014), for example, examined how companies could use social media versus traditional websites, to build affective relationships in order to foster trust and increase buying intention. In an experiment with 44 participants, they assessed how users perceived the trustworthiness of an online store, either through a traditional website, or through social media, finding that the social media sight enabled more direct interaction and communication, thus fostering affective trust more. Canavari, Fritz, Hofstede, Matopolous, and Vlachopoulou (2010) discuss various strategies for fostering trust within the context of e-commerce for agri-food chains. They identify synchronous communication, as well as transparent and clear communication regarding products, sellers and the selling process to be important factors leading to trust.

Beldad and colleagues (2010) offer another literature review of studies examining trust within the context of e-commerce, and to a lesser extent the contexts of e-government and e-health. The goal of the review is to identify antecedents of trust within those contexts. In their review, Beldad and colleagues (2010) distinguish between customer/client-based antecedents (e.g. propensity to trust, or experience with the internet), website-based antecedents (e.g.

information quality, graphical characteristics), as well as company-based antecedents (e.g. organizational reputation, offline presence). However, Beldad and colleagues (2010) do not clearly distinguish which type of trustee they are examining. Some antecedents appear to be applicable to trust in the internet (i.e. especially the website-based antecedents), while others are applicable to interpersonal trust within the digital context (i.e. especially the client and company based antecedents).

Overall, research has identified many antecedents of trust in online commerce. The studies show that the antecedents of ability, benevolence and integrity are still important, yet many other context specific factors come into play. Some of the identified constructs are also applicable to the coach-athlete relationship: For example, design elements fostering trust in coach could be implemented into a training platform in order to increase the perceived trustworthiness. Similarly reputation systems and information about coach can be provided to influence the perception of trustworthiness, as well as providing the opportunity for direct interaction and communication through the digital medium. Besides these findings from research on e-commerce, interpersonal trust through digital interactions has also been examined within digital work teams. The findings of that research will be presented next.

4.4.1. Trust Antecedents Researched in Virtual Teams

Another area where much research on trust within digital environments has been conducted is research on virtual teams. These teams allow companies to utilize the knowledge and expertise of employees to work together and solve problems, regardless of where they live. Research in this area focuses on how trust is developed within (globally) distributed teams.

Already early on, research on virtual teams has identified trust as an important factor: O'Hara-Devereaux and Johansen (1994) state that trust is vital in holding global, virtual teams together. Jarvenpaa and Leidner (1999) examined the development of trust within global teams and found that a form of swift trust developed among team-members. In their study, they examined the development of trust in groups of four to six students, collaborating in international study projects. In total, their sample comprised 350 students. Jarvenpaa and Leidner (1999) found that the temporary work groups formed swift trust, facilitating cooperation, yet that the trust was fragile and easily broken.

Examining the antecedents of trust within those teams, Jarvenpaa, Knoll and Leidner (1998) examined the applicability of the antecedents ability, integrity and benevolence with global, virtual teams. They found that early on in the teamwork process, the perception of integrity was most important for developing trust, while benevolence was least important. The importance of the perception of team members' ability declined throughout the team work

process. Similarly, Zolin, Hinds, Fruchter, and Levitt (2004) examined the development of trust within student work groups over several months. By measuring both perceived trustworthiness as ability, benevolence and integrity, as well as actual trusting behaviors (e.g. checking and controlling the work of co-workers) they found that especially early perceptions of trustworthiness were important, influencing trusting behaviors and remained stable throughout the working process.

With regard to specific trust antecedents within virtual teams, research recommends that virtual teams incorporate face to face meetings into the teamwork, if possible, either through initial team-building exercises or through site visits. In one early study, De Meyer (1991) conducted interviews with employees and management of 14 different internationally working companies in order to assess which techniques they implement in order to foster trust and team work. They found that initial face to face interactions, as well as boundary-spanning individuals organizing the flow of communication and information were important factors. Similarly, Maznevski and Chudoba (2000) analyzed three global virtual teams over a course of 21 months, implementing both qualitative and quantitative methods. Their results indicated that regular face-to-face meetings were important for trust and cooperation within the teams to grow. Jarvenpaa, and colleagues (1998) were able to show that an initial kick-off event could be beneficial to teamwork, even without face-to-face contact: They examined the effect of initial, yet virtual, team-building exercises to kick off global, virtual team work. A sample of 350 participants were recruited, and the findings suggest that the virtual team-building exercise had a beneficial effect on trust.

Another important antecedent research in virtual teams has examined is communication: Jarvenpaa and Leidner (1999) identified important communication strategies depending on the phase of cooperation, when analyzing their case studies of student collaboration groups. Social communication and enthusiastic communication were found to be especially important in building trust early on in the collaboration. Later on, especially predictable communication, as well as timely responses and frequent feedback were important. In their study, Meyerson and colleagues (1996) found that pro-active enthusiastic and generative styles of action were beneficial to fostering trust. Furthermore, self-disclosure and sharing of personal information appear to be important for generating trusting beliefs. Rocco and colleagues (2000) conducted interviews with over 50 employees of an internationally working company to identify trust fostering factors: They found that familiarity defined as a condition of mutual understanding, a shared group identify, i.e. a feeling of being like others within the group, as well as work and non-work-related communication were important factors. When those factors were prevalent,

workers in the company indicated they would trust their colleagues more. Hinds and Mortensen (2005) found that spontaneous communication fostered a sense of shared identity and thus reduced mistrust as well as task and interpersonal conflicts. They found this effect by comparing 21 distributed teams with 22 co-located teams and analyzing the communication patterns and conflicts in each team.

Next to communication, research has found that actual task performance and group work outcome influence trust as well. In their study with 38 student teams working together virtually across six different universities, Kanawattanachai and Yoo (2002) found that both high and low performing teams started with similar trust levels. However, the high performing teams were better at maintaining cognitive trust. Thus, the researchers conclude that trust can lead to better performance, while better performance also leads to higher trust. In another study, Peters and Karren (2009) assessed perceived team performance as well as trust of 195 team members from 33 different virtual teams. They found that trust had a direct impact on team performance. However, when analyzing manager assessment of team performance, no direct effect of trust could be found. Rather, a moderating effect was found, because trust moderated the effect of functional diversity on team performance, as perceived by the managers. A meta-analysis was conducted on the relationship of trust and team effectiveness, analyzing 52 studies with a total of 1850 teams (Breuer, Hüffmeier, & Hertel, 2016). Breuer and colleagues (2016) found an overall positive effect of trust on team effectiveness. This effect was stronger in virtual teams, indicating that trust is even more important in virtual teams, than it is in co-located teams.

In summary, the research on trust within virtual teams also offers useful insights that might be applicable to trust within the coach-athlete relationship: The mixture of both digital as well as face to face interactions is viable within the coach-athlete relationship and could be beneficial to the development of trust. Furthermore, the implementation of communication strategies described by Jarvenpaa and Leidner (1999), as well as the findings on task performance might offer useful input on how to enhance trust within the coach-athlete relationship. Before possible ways of applying these findings to that specific setting will be discussed, one last area of research will have to be highlighted: Research implementing Social Presence Theory and Media Richness will be discussed next.

4.4.3. Trust Antecedents through Social Presence and Media Richness

Some studies have also looked at how social presence and media richness, the previously discussed theories, are related to trust building in digital and online environments. Gefen and Straub (2004), for example, proposed that a sense of high social presence within the context of an e-commerce site would lead to more trust in the website and thus lead to people purchasing

via the website. In a set of two consecutive experiments (226 participants in study 1, 161 participants in study 2), they tested which dimensions of trust had the most impact on purchase intention within the e-commerce context, as well as how social presence influenced these constructs. They found that all trust scales were influenced by perceived social presence, but that only trusting beliefs about e-vendors' integrity predicted intention to purchase. Yet, this study is also another example of mixing two conceptually different types of trust, i.e. interpersonal trust within digital environments, as well as trust in digital technology. The trust in the website measured is something conceptually different from the trust in the e-vendor, making it difficult to interpret the findings and apply them to another setting.

In another study, Burgoon, and colleagues (2002) assessed the performance of 80 university students in a task with a confederate, virtual cooperation partner. By varying the communication richness and assessing trust as well as task performance, Burgoon and colleagues (2002) found that richer communication media lead to more trust as well as better performance. Warkentin and Beranek (1999) assess how well digital communication competences could be trained, using social presence and media richness theory. In their experiment, 38 participants were divided in virtual teams and given a training intervention. They found that the treatment group developed improved perceptions of the interaction process, developed more trust and showed better communication strategies.

Hakonsson, Obel, Eskildsen, and Burton (2016) conducted a literature review, analyzing literature on media richness theory, as well as cooperative behaviors in virtual teams and conclude that media richness, among other factors, influenced cooperation and social behaviors in virtual teams. Contradictory findings, however, are reported by Walter and colleagues (2014), who found that perceived social presence was important for enjoyment of interaction in a laboratory experiment, not, however, for the development of trust in a cooperation partner. In their extensive literature review, Biocca, Harms, and Burgoon (2003) discuss the methodological and theoretical limitations of social presence theory in explaining (digitally) mediated communication and behavior, offering an explanation for the contradictory findings research has delivered thus far.

Overall, results from research are varied, indicating more or less trust development through digitally mediated communication. Some factors seem to be beneficial for the development of trust and seem applicable to a wide range of situations e.g. mixing digital with face to face interactions, implementing an initial face to face meeting between virtual team members, self-disclosure and sharing personal information to give more insight into individual background, responding to requests timely to show attention and care, keeping promises and

being transparent about difficulties or general procedures. The overall mixed results regarding media richness, social presence, digital communication and trust can be explained by the complexity and multi-facetted nature of the situations researched. What may hold true for an internationally functioning virtual team with little social interaction and low task cohesion, is not necessarily applicable to the interactions of two people interacting on an online auction website or in e-commerce. This highlights the importance of researching trust in digital environments situation and context specific: It is necessary to identify differences and similarities between different online environments, in order to determine which trust findings are applicable to a new situation, and which are not. In any case, it is important to test existing knowledge within the new situations.

For the current research in particular, this new situation is the coach-athlete relationship: both coach and athlete share physical, face to face interactions, as well as digitally mediated interactions and show higher task cohesion. Thus, findings from big virtual teams are less applicable, than findings from smaller work groups who also share face to face meetings. Thus far, no research has attempted to apply the findings from these areas to the coach-athlete relationship. Drawing on the previous research from other domains, some assumptions can be made and hypotheses proposed for the development of trust through digital interaction within the coach-athlete relationship. Yet, it is important to test and assess these assumptions for the specific situation and interaction between coach and athlete.

It is the goal of this dissertation to fill that gap in the research and address those questions. However, before going into more detail about the development of trust within the coach-athlete relationship through digital communication, it is first necessary to take a look at trust in the internet, and trust in technology in general. In this chapter, a distinction was made for “online trust” being either trust in the internet, or interpersonal trust within a digital context. The latter has been discussed and defined in this chapter. However, the former has not yet been discussed. Thus, the following chapter will illuminate the concept of trust in technology, discussing relevant research findings, before proposing a research model of trust in coach though digital communication, as the base for this research.

5. Trust in Technology

In the previous chapter the different meanings of the phrase "online trust" either pertaining to trust in people through technology, or trust in the internet were discussed. This is a discussion mirrored in the literature on Information Sciences (IS). Öksüz, Walter, Distel, Räckers and Becker (2016) argue the importance of differentiating between trust mediated through technologies (i.e. usually the internet or other communication technologies), trust in the technology itself, and trust in what they call quasi-humans. Quasi-humans are specific human-like technologies, e.g. recommendation agents or online avatars. They are a specific type of technology, yet they imitate a human more closely than any other types of software (Öksüz, et al., 2016). Thus, the main difference is reduced to trust through technology, or trust in technology, regardless of whether the technology imitates humans or not. Similarly, Söllner, Hoffmann, Hoffmann, Wacker and Leimeister (2012) argue to distinguish which role technology plays within an interaction: Technology can either be in a mediator role, or in the trustee role as seen in figure 8, while the trustor remains the coach or athlete in both cases.

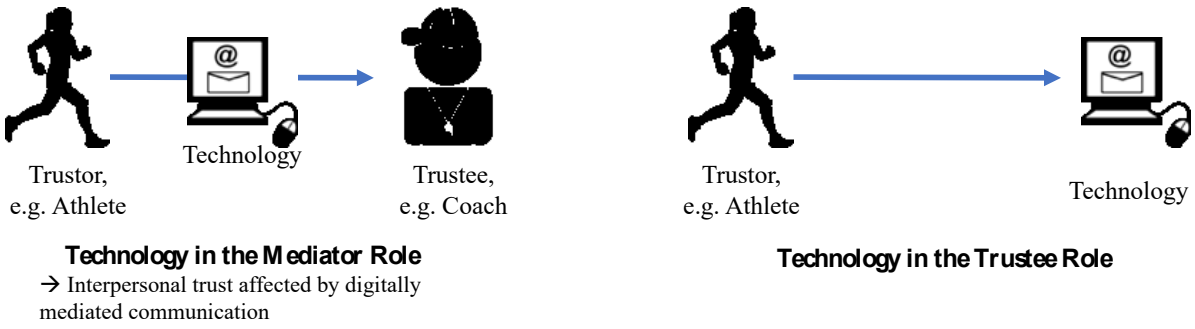

Figure 8. Depiction of technology roles within coach-athlete interactions
Depiction by author, adapted from Söllner and colleagues (2012)

When technology is in the mediator role, communication occurs within a digital context, and interpersonal trust, or trust in an organization are examined. The technology mediates the communication between two partners, e.g. a coach and their athlete, and influences the interaction and perception of the two, as has been discussed in the previous chapter. When the technology is in the trustee role, however, the concept of trust in technology itself comes into play. In this case a person is directly interacting with a technology and the subject of interest is not the human partner at the other end of the technology, but rather the technology itself. This distinction technology roles fill mirrors the discussion by Öksüz and colleagues (2016), as information science (IS) research either looks at trust *in* (discussed in this chapter) or trust *through* (discussed in chapter 4) technology.

The following sections aim at examining the construct of trust in technology. In order to do this, the first step will be to look at what counts as technology and is typically examined within this field of research. A definition of technology will be presented for the current research question (5.1.). The construct of trust in technology will be discussed by looking at trust-related constructs and defining trust in technology (5.2.), before discussing several models and their specific antecedents of trust in technology (5.3.). Finally, in a last step, a model of trust in technology will be presented, which will be implemented for the current research (5.4.).

5.1. Defining Technology

When examining trust in a technology, the first step is to look at the technology itself, and which types of technology will be included in this discussion. The question arises what exactly counts as a "technology". Research thus far has not found consensus on this question. Rather, this varies from research question to research question, as well as from discipline to discipline. From the hardware – the motor in a car with turning clogs, or a computer with tiny microchips – to the software – a computer program, the onboard software in a smart car or the internet in its entirety – various aspects are examined under the term "technology". Ropohl (2009) discusses various definitions and linguistic differences of the term "technology", including broad and narrow definitions. According to Ropohl (2009), technology in its broadest sense refers to any form of adaption of natural resources for human use, thus including, for example, the sharpening of a stone, to use as a knife. This definition, however, is much too broad for the current research approach. The question of whether one would trust a knife or not seems absurd.

In a narrower definition, the term technology refers to both hardware and software of information technologies and computers (Ropohl, 2009). In this case both the computer chips, electronic cables, light bulbs and other technological aspects of the hardware are included, as well as the programs, algorithms and software run on the hardware. Within the field of IS, an even narrower definition is applied. The term technology most commonly refers to information technologies (IT) (Öksüz, et al., 2016). In this case, IT refers to any technologies, which can electronically store, distribute, transform or process information (Chandler & Munday 2011). This definition encompasses the entire internet, individual websites, programs, apps and any other form of computer software. However, IT does not include the hardware, on which the information is stored or processed. Whether to include the hardware into the definition of technology is an important question, when it comes to discussing what exactly can fulfill the role of a trustee. Some researchers argue that while trust in software is possible, when it comes to the hardware, not trust, but rather reliance or dependence play the essential role (Öksüz, et

al., 2016). Therefore, one could argue that a definition of trust in technology including trust in hardware, is too broad, whereas an application merely to the context of software would be more appropriate.

However, the more complex a technology is, the harder it is for people to distinguish between the hardware and software. When the function of a technology fails to perform as it is supposed to, it is not always clear if this is a malfunction of the hardware, or of the software, or a faulty interplay of the two. Thus, for the current research, the following understanding of the term technology will be used: Foremost, technology refers to the IT, i.e. the software, program, website or the internet as a whole, storing, processing and disseminating information. For the current research, additionally the device on which the software runs can also hold the role of a trustee, whenever it cannot be clearly distinguished from the software itself. Applied to the context of communication within the coach-athlete relationship, various aspects are subsumed under the term technology: On the one hand, the hardware, i.e. the actual technological device, will be examined, e.g. a wearable, GPS-tracking watch or heart-rate tracking device. When athletes or coaches talk about trusting in their training technology, it is doubtful whether they consciously distinguish the actual wearable from the software running on the device. For this reason, the device itself is included into the technology term. On the other hand, the software and programs used, e.g. an app, training platform as a website or chatand communication programs as well as algorithms calculating optimal heart rate, will equally be examined. Thus, trust in the digital training technology in its entirety is scrutinized.

Now that it has been defined what the current research refers to with regard to technology, the next question to be addressed is the question of how to define trust. With each discussed model or definition of trust in technology it will also be addressed which technology term the researchers refer to. The following chapter, however, first focuses more directly on a broad definition of trust in technology and distinguishes it from related constructs, as well as highlighting the relevance of the construct.

5.2. The Question of Trust in Technology

As previously discussed, some researchers raise the question of whether trust in technology as a phenomenon exists, or whether it is distinct from perceptions of reliability or reliance on technology. The following paragraphs address these questions, highlighting how trust in technology is distinct from reliance on technology (5.2.1.), as well as which effect technology has on user outcomes (5.2.2.).

5.2.1. Technology in the Trustee Role

Some researchers argue that trust in technology is, in fact, nothing more than a perception of technology's reliability: Nickel, Franssen and Kroes (2012) mathematically argue that trust in a technology is merely a function of how well one expects the technology to perform, and thus is not distinct form reliability judgments. They argue that trust in a technology, as well as perceptions of its reliability, are the expectation that a technology will perform as intended by the engineers. Furthermore, Nickel and colleagues (2012) proceed to argue that any perception of trust in a technology going beyond reliability of the technology, rely solely on the human manufacturers of the technology, i.e. is in fact trust in humans.

Similarly, it could be argued that people depend on technology to function properly, but do not actually trust it. Users of a technology rely on the wiring to be installed properly, software to run as programmed and the interplay between the hardware (i.e. the wiring) and the software to function without fault. As discussed in chapter three, reliance and trust are separate and distinct constructs. Reliance is a rational choice based on positive expectations, yet is void of an emotional component, and thus does not qualify as trust (Mouzas, et al., 2007). In the case of technology, the expectation that a device will work as promised is based upon a rational choice, rather than an emotional component.

Going even further, other positions argue that trust in technology is categorically a faulty construct and not possible, as technology does not have its own volition: Friedman, Kahn, and Howe (2000) discuss a conceptual framework of trust online, discussing trust in e-commerce interactions, as well as interpersonal interactions online. They come to the conclusion, that "people trust people, not technology" (Friedman et al., 2000; p. 36) Thus, this line of research argues that without volition, technology cannot "behave" in a trustworthy or untrustworthy way; therefore, the concept of trust in technology is faulty. In order for trust to emerge, it is important for the trustee to act out of volition and out of its own free will. If a trustee cannot choose to exploit the trustor, then the term is in fact not correctly applied. As technology does not have its own volition, the term trust is falsely applied. While technology can indeed fail, or disappoint trust set in it, this is not an act of trust-breaking, as it is not done voluntarily. Rather, it becomes a question of (un)reliability. This line of research argues that the concept of trust relies on the object of trust intentionally breaking trust, something that cannot be said of technology.

Reeves and Nass (1996), however, introduced the "social actor role" of technology: In a series of experiments based on social psychology experiments of human-human interactions, Reeves and Nass (1996) tested whether participants would respond politely to a computer

according to rules of social interactions. Indeed, they found that participants responded more politely to a computer they were working with, compared to another computer, with which they had not yet previously interacted. In a series of several studies, Reeves, Nass and colleagues examined how participants reacted to and interacted with computers, finding that participants were rude or polite to computers, identifying them either as dominant or timid and interacting with them in accordance with implicit general rules of social interaction (e.g. Nass, & Moon, 2000; Nass, Reeves, & Lesher, 1996; Nass, Steuer, & Rauber, 1994; Reeves and Nass, 1996). Participants interacted with the computers as if they were interacting with people, treating them as a social actor. Thus, the researchers concluded that in interaction with technology, we ascribe the technology attributes of a social actor, including trustworthiness. The conclusion was that people can, indeed, trust technology the same way they trust people (Sztompka, 1999). This line of research thus argues that the concept of trust does not rely on the object of trust intentionally breaking trust, but rather relies on the attributes the trustee transfers to the trustor, i.e. the perception of the trustor. As people transfer attributes of a social actor to computers, trust in technology is possible, regardless of volition and intention. For the trustor it is not important if the trustee intentionally breaks trust, or out of lacking ability, the result in this case for the trustor is the same.

Therefore, research has used the social actor role of technology as a basis to examine trust in technology. As with the general definition of trust, conflicting definitions exist. However, in its core, the concept of trust itself remains the same as the definitions of trust previously discussed: Trust remains a willingness to be vulnerable to another entity, in this case a technological device (e.g. McKnight, 2005). Thus, trust in technology is also distinct, from reliance on technology, in the same way that trust in another person is distinct from reliance on another person. This definition by McKnight (2005), however, does not specify which types of technology are to be included. Generally speaking, in technology research a clear definition of what is included in trust in technology is often missing. Oftentimes trust in technology is defined within the restraints of IS research (e.g. Ösküz, et al., 2016; Söllner, et al., 2012) while other times research merely discusses trust in the internet (e.g. Beldad, et al., 2010) or trust in a specific program (McKnight, Carter, Thatcher, & Clay, 2011), without clearly defining the technology.

The difference within the trust definition lies not within the construct of trust itself, but within the trustee, his or her traits and the applicability of specific trusting beliefs. Some attributes of people and technologies might be similar, while others are most certainty distinct (McKnight, 2005). The antecedents of trust in technology are thus based on a user's perception

of the technology's ability to deliver the promised functions and features and will be discussed in more detail in section 5.3.. First, however, a look will be taken at the effects of trust in technology.

5.2.2. Effects of Trust in Technology

Researchers looking at trust in technology have used the construct of trust in order to explain various aspects of technology use. Trust in technology has been looked at, in order to explain two aspects: firstly, trust in technology can predict the adoption and initial use of a new technology, while secondly, trust in technology can predict the continued use of a technology after initial adoption. These constructs go beyond what reliability or dependence might be able to explain.

Research attempting to explain the initial use of a technology have turned to concepts of initial trust: They argue that especially within the early phases of technology adoption, the uncertainty and perceived risk are high, resulting in the concept of trust being especially important (e.g. McKnight, Choudhury, and Kacmar 2002b; Wang & Benbasat, 2005). Janson, Hoffmann, Hoffmann, and Leimeister (2013) tested the importance of initial trust for technology adoption, by assessing initial trust in a mobile marketing application, as well as intention to use the application. In a sample 116 university students participating in an online experiment, Janson and colleagues (2013) were able to show that initial trust predicted intention to use a new technology. Similarly, Vance, Elie-Dit-Cosaque, and Straub (2008) conducted a literature review examining research on initial trust and technology use. In their review they found that initial trusting beliefs in an IT artifact predicted intention to use the artifact.

Another reason why initial trust in a technology is important, may be found in low switching costs and high market competition within the area of IT services, e-commerce and other online services (Koufaris & Hampton-Sosa, 2004). If a customer is dissatisfied with an IT service, they are likely to switch to a new provider they perceive as being trustworthy. In an online experiment with 212 participants, Koufaris and Hampton-Sosa (2004) found that aspects of the website, i.e. the IT artifact, predicted initial trust in a new online store. Thus, they conclude that trust in the website influenced trust in the company and was able to predict whether customers would buy from a store or not. When searching for new service providers online, or switching providers, the one who is perceived as the most trustworthy, will be the one people choose to hire.

In summary, the construct of trust in technology is able to predict adoption and initial use of a technology. This holds true either for people switching services, or else people initially adopting a technology. These constructs go beyond mere assessments of reliability of an IT and

provide additional information. This information is also valuable for designers of IT artifacts, interested in designing the technology to foster trust (Nickel, 2015).

Besides initial trust, knowledge-based trust also has an impact on technology use. McKnight and colleagues (2011) examine trust in a technology one is familiar with and has used before. They hypothesize that knowledge based trusting beliefs in a specific technology will influence deep structure use and exploration of further functions. In their study with 376 student participants, they were able to confirm their assumptions: Participants who reported higher trust, were also more willing to explore new functions of a technology as well as to continue using it. Additionally, trust can also influence how other technology attributes are perceived: McKnight (2005) argues that a technology perceived as being trustworthy will also be perceived as being more useful and advantageous over another technology. Thus, trust mediates the way other factors influence technology use.

With regard to the coach-athlete relationship, and the context of sport- and exercise technologies, trust in technology could be an important factor predicting the adoption and continued use of the technology. Athletes who trust a technology are more likely to adopt the use of the technology. Within a sport and exercise context, exercise apps might offer a way to help more people start being active and lead a healthy life. Besides technology adoption, trust in technology also influences continued technology use and deep structure exploration. Thus, trust in technology might also be able to help people stay active, once they start using an exercise technology. Within the context of elite sports, the technologies can help athletes and coaches to optimize training and thus facilitate the development of expertise. In order for the technology to help, it is first important for both coach and athlete to trust it. Thus, the construct of trust in technology is important for the current research.

Thus far, both the different types of technology under examination, as well as the general construct of trust in technology have been defined. Furthermore, different effects of trust in technology have been discussed. The following paragraphs now aim at discussing different models, highlighting possible antecedents of trust in technology.

5.3. Models and Antecedents of Trust in Technology

Assuming that trust in technology as a construct exists, the next question is how this construct can be perceived, understood and theoretically examined. Research on trust in technology has tried to answer this question by examining possible antecedents of trust in the technology itself. In an attempt to examine antecedents of trust in technology, different approaches have been chosen: Some researchers have accessed this topic from an interpersonal trust perspective and have applied the Mayer and colleagues (1995) model with its antecedents

to the trustee of a technology. Others have developed technology specific models based on trust in automation, or else based off of attributes of the technology itself. The following table (table 2) gives an overview over trust in technology antecedents.

Table 2. *Overview of trust in technology antecedents.*

Model Basis	Antecedents of trust	Trustee	Source
Interpersonal trust (Mayer et al., 1995)	Ability Benevolence Integrity	Online recommendation agent	Wang and Benbasat (2005)
Interpersonal trust (Mayer et al., 1995)	Ability Benevolence Integrity Predictability	Online e-commerce store	Gefen and Straub (2004)
Interpersonal trust (Mayer et al., 1995)	Ability Benevolence Integrity Technology Acceptance	Online e-commerce store	Gefen, Karahana. & Straub (2003)
Interpersonal trust	Predictability Dependability Faith	Automation (e.g. Autopilots)	Muir, 1987
Trust in automation (Muir, 1987)	Purpose Process Performance Foundation	Autopilots	Lee and Moray (1992)
Trust in automation (Muir, 1987)	Predictability Dependability General Faith	Autopilots	Muir (1994) Muir and Moray (1996)
Trust in automation (Muir, 1987)	Purpose Process Performance	Autopilots	Lee and See (2004)
Trust in automation (Muir, 1987)	Purpose Process Performance	Mobile Applications	Söllner et al. (2012)
Technology traits	Website quality Store brands	Online store	Lowry, Vance, Moody, Beckmann, Read (2008)
Technology traits	Familiarity Personalization	Recommendation agent	Komiak and Benbassat (2006)
Technology traits	Functionality Reliability Help-Function	Specific Software (i.e. Excel)	McKnight et al (2011)

In general, the studies listed in the table share the same definition of trust yet implement different conceptual models. The table gives an overview over different antecedents. Some of the studies have additionally imbedded the antecedents into a larger model of trust in technology, while others merely examine the predictive value of the antecedents, without a larger overarching model. In order to highlight and discuss the different models in more detail, the following chapters expand on this research and discuss it more closely.

5.3.1. Interpersonal Trust Antecedents Applied to Trust in Technology

One avenue of trust in technology research thus far has been to apply interpersonal trust antecedents, i.e. ability, benevolence and integrity, to technologies. Many researchers did not develop specific models of trust in technology, but rather transferred or adapted interpersonal trust models. Through literature reviews and theoretical work, researchers either applied the antecedents' ability, benevolence and integrity as they were to the IT, or else slightly adapted the constructs by adding additional antecedents or modifying the existing ones.

For example, Wang and Benbasat (2005) examined trust in online recommendation agents in their study. They used the antecedents' ability, benevolence and integrity in a laboratory experiment and were able to show a validity of those trust constructs for the online recommendation agent. Similarly, Gefen and Straub (2004) examined predictability as a fourth factor additionally to ability, benevolence and integrity when examining trust in an online store. In two separate studies examining trust in an online store, as well as in an online service they found their conceptualization of trust to be valid with predictive value explaining purchase intentions. Vance, and colleagues (2008) conducted a literature review in order to develop and then test a trust model integrating system quality constructs and predicting use of mobile shopping technologies. Besides assessing institution-based trust in the internet in general, they assessed specific trusting beliefs in the mobile shopping application through perceived ability, benevolence and integrity on a sample of over 200 university students both from the US and France, finding nomological validity. They were able to predict the use of the mobile shopping technology, through the constructs of perceived ability, benevolence and integrity, as well as institution based trust in the internet. In another study, Gefen, Karahanna, and Straub (2003) integrated a model of trust in technology, measured as perceived ability, benevolence and integrity, into the technology acceptance model (TAM). Through extensive literature review, Gefen and colleagues (2003) developed their research model based on knowledge-based trust of the IT artifact, as well as trust in structural assurance, and integrated it with the TAM. In their sample of 213 participants with experience in e-commerce, they found that both TAM and trust in the online store explained consumer behavior. Both TAM and trust were able to explain

additional amounts of variance in consumer behavior, showing that trust in technology as a construct in general was distinct from the concepts of technology acceptance.

In summary, various studies have applied the antecedents of ability, benevolence and integrity to different forms of technology, from recommendation agents to online stores, and found nomological, as well as predictive validity. However, trust in technology is examined in settings where it is not entirely distinct from interpersonal trust: When examining trust in an online store or recommendation agent, it is questionable whether participants in the studies indeed felt trust in the digital technology, or rather the actual store and the people behind it.

Despite these findings, other researchers argue against the use of interpersonal trust models for trust in technology: Gefen later re-evaluates the applicability of the ability, benevolence and integrity used in his previous studies. Gefen, Benbasat, and Pavlou (2008) suggest a research agenda for online trust, in order to provide a conceptual foundation of trust in online environments. Gefen and colleagues (2008) discuss the role of trust in the IT artifact, as well as mediated interpersonal trust through technology. With regard to trust in the technology itself, they raise the question of the applicability of interpersonal trust models. Rather, they argue for the need of specific models of trust in IT artifacts, in order to increase trust in and thereby the use of e-commerce. Similarly, other researchers emphasize the importance of examining technology specific antecedents (Nickel, 2013), and that attributing a technology traits such as benevolence is taking the social actor role of technology too far (McKnight et al., 2011). Therefore, the following paragraphs discuss different antecedents of trust in technology, based upon technology-centered models.

5.3.2. Trust Antecedents based off of Trust in Automation

This line of trust in technology research argues that it is better to develop specific models of trust in technology when examining it (McKnight et al., 2011; Söllner, et al., 2012). In early research, Muir (1987) analyzed trust in decision support systems and how decision support systems might be designed to foster trust. Using interpersonal trust as a starting point, she analyzed which machine specific aspects foster or undermine trust development. By integrating extensive literature reviews and taxonomies of trust, Muir developed a first model of trust in decision support systems. She developed a model of trust in technology based upon interpersonal trust conceptualizations, yet specific to technology traits and attributes. By describing the dynamics of human-machine interactions, Muir (1987) identified three important dimensions: predictability, dependability and faith.

Building on this initial work, Lee and Moray (1992) later examine trust in automation systems, attempting to answer the question of when humans choose to rely on automation and

when they choose to engage in manual control. They identify four important components of trust in automation, namely purpose, process, performance and foundation. Purpose reflects the designer's intention when creating the systems, the main function the system was intended to fulfill. The dimension of process describes the rule bases and control algorithms that govern how the system functions and behaves. Performance reflects the expectation that a system will behave and function in a consistent and stable manor, while the final dimension, foundation, represents a fundamental expectation of natural and social order. In order to test this model of trust, Lee and Moray (1992) conducted a simulation experiment with 19 students. They found that especially the dimensions of performance and process were predictive of whether or not participants chose to trust the automation, or else engage in manual control. Similarly, Muir and Moray (Muir, 1994; Muir & Moray, 1996) further discuss the relevance of those dimensions, as well as integrating dimensions of predictability, dependability and general faith. In a set of laboratory and simulation experiments, Muir and Moray (1996) determined that the competence of an automaton was an important determinant for trust. Additionally, predictability, dependability and faith were important factors for developing trust, or distrust if the constructs lacked any of these features.

In a more recent application of this model, Lee and See (2004) analyzed the characteristics of an automaton, the context of its application and underlying cognitive processes in order to determine trust. Through literature review, they find that the context is important in determining the impact of which automation characteristics are predictive of trust. Overall, Lee and See (2004) determine the previously identified factors of performance, process and purpose to be predictive of trust in automation. These dimensions of trust reflect different characteristics of the automaton and are applicable to other forms of technology as well: Performance describes the capabilities a technology has, process describes the underlying qualities, i.e. the algorithms and programs determining how the technology works, while purpose describes the motives and reflects the intentions of the developer or programmer of the technology (Janson, et al., 2013; Lee & See, 2004).

In a final developmental step to this conceptualization of trust in technology, the concepts of trust in automation were applied to other forms of technology: the trust in automation dimensions by Lee and See (2004), were broadly applied to other forms of technology within the model of trust in IT artifacts by Söllner and colleagues (2012). Through literature review, Söllner and colleagues (2012) developed a new model of trust in technology, based on the factors performance, process and purpose (see figure 9). They tested their model of trust in technology in a laboratory experiment with 284 university students. In their study, they found good applicability of their trust model, explaining how initial trust in an IT artifact developed. Later, the model was applied to another context, explaining trust in mobile marketing applications (Janson, et al., 2013). In their study, they assess the development of trust in an online experiment depicting a fictitious mobile application on a sample of 116 participants. Overall, the researchers were able to confirm their research model and found that the dimension of performance had the strongest predictive abilities.

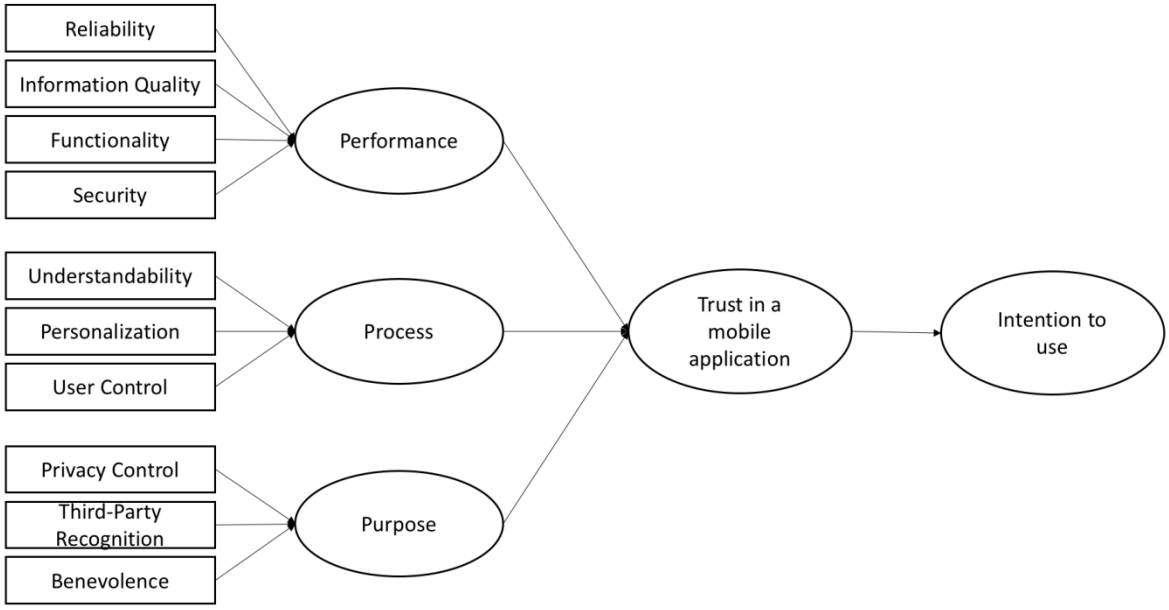

Figure 9. Model of trust in mobile applications.
Depiction by author, based on Janson and colleagues (2013)

Overall, these models of trust in technology have the advantage of examining characteristics and traits of the technology itself, rather than applying human attributes (e.g. benevolence) to a technology. However, these conceptualizations are based on a specific type of technology, i.e. automation. The models were initially developed in order to determine when people choose to trust an automation, or else engage in manual control. The model of trust in technology was then developed by generalizing from this specific type of technology, to other

types of technology, applying the characteristics of this specific technology to others. Thus, another conceptualization of trust in technology was used for the current research, one that specifically looks at traits of technology in general. The following paragraphs discuss some technology specific attributes, before presenting the model of trust in technology used for the current research.

5.3.3. Trust Antecedents based on Technology attributes

Orlikowski and Iaconno (2001) wrote a comment on the status quo of IT research, in which they argue for a stronger focus on the IT artifact and its individual attributes. Responding to this call, some researchers have abandoned the idea of applying interpersonal trust models to technologies, and instead focus on aspects of the technology itself. Lowry, Vance, Moody, Beckman and Read (2008), for example, examined the role of initial trust in predicting the use of an online store. They conceptualize the trust in the online store as a function of the website quality, i.e. navigability, graphical style and functionality, as well as the brands represented in the online store. They tested their assumptions on a sample of nearly 300 participants in an online experiment. Overall, Lowry and colleagues (2008) were able to show that website quality, brand awareness and brand image could predict initial trust in the e-commerce store. Another approach has been to examine familiarity as well as personalization as predictors of trust in online recommendation agents: Komiak and Benbasat (2006) examined how the individual personalization of a recommendation agent, as well as the familiarity with it could influence cognitive and emotional trust in the recommendation agent. In their sample of 100 participants, Komiak and Benbasat (2006) were able to show the validity of their assumed model. Both personalization and familiarity could predict trust, which in turn had an impact on the IT adoption.

Overall, the studies discussed thus far provide valuable insight into the nature of trust in technology. They show predictive value of the construct, with regard to intention to use a technology, or purchase from an online store. However, either the models are lacking a focus on technology specific attributes (as in 5.3.2. concentrating on only one specific type of technology or 5.3.1. focusing on interpersonal trust models) or else are lacking a theoretical base (as in 5.3.3.). Thus, the current research implemented another model of trust in technology, which was developed based upon technology-specific traits while implementing a firm, theoretical base. This model will be discussed in the following paragraphs.

5.4. Specification of the McKnight Model of Trusting Beliefs in a Specific Technology

McKnight and colleagues (2011) set out to develop a model of trust in a specific technology based on the attributes of the IT artifact. Through extensive literature reviews, the

researchers identified important constructs used to examine trust in general, as well as trust in technology. Thus, they developed a model of trust in technology, integrating initial trust, as well as knowledge based trust, based on trusting beliefs of technology-specific attributes (see figure 10).

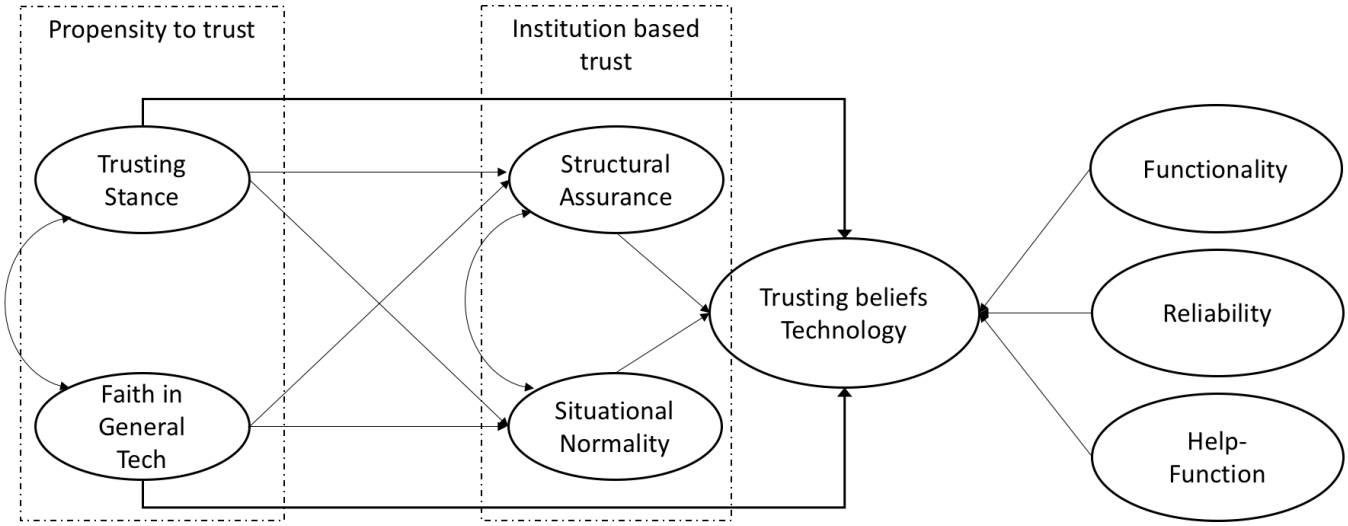

Figure 10. Model of trust in a specific technology.
Depiction by author, based on McKnight and colleagues (2011)

Items to evaluate the model were based on interpersonal trust items from other published research and were constructed by experts familiar with the constructs. In several rounds, the items were presented to students, who assessed the item fit to the constructs via card sorting tasks. The items were adapted where needed, resulting in a final questionnaire of 26 items, assessing all aspects of the model. Once the model and measurement items were developed, McKnight and colleagues (2011) tested it in a multi-step process, assessing the reliability of measurement scales, as well as nomological and predictive validity. Data were collected from 376 university students and the first order, second order and structural models were tested. Overall, McKnight and colleagues found good validity of their model, thus developing a model of trust in technology, specifically developed for a broad applicability to various technologies, integrating initial and knowledge based trust. The following paragraphs give an overview of the central aspects of the model

5.4.1. Central Aspects of the Model

The model of trust in technology incorporates a model of initial trust in the technology based on a general propensity to trust technology, as well as situational normality of using

technology, as well as knowledge-based trust based on specific trusting beliefs. According to McKnight and colleagues (2011), the general propensity to trust technology predicts situational normality of technology use. Both general propensity, and situational normality, in turn, influence the specific trusting beliefs of the knowledge-based trust, as seen in figure 10.

The general propensity to trust technology is based on the propensity to trust people (McKnight & Chervany, 2001) and describes a dynamic individual difference. It is neither situation-, nor trustee-specific, but describes a general willingness to depend on a technology, regardless of the specific technology. The general propensity to trust is composed of two constructs, i.e. *faith in general technology*, as well as *trusting stance-general technology*. McKnight and colleagues (2011) describe these constructs as follows: Faith in general technology characterizes an individual's beliefs about technologies and their attributes in general. This construct describes the beliefs about the functionality, reliability and helpfulness of technologies in general. Someone with higher faith thus assumes that technologies are inherently functional and helpful, while someone with lower faith might assume that technologies are not always helpful and might be more skeptical. Trusting stance, on the other hand, describes the degree to which users of technology expect positive outcomes from technology use. Technology users with higher trusting stance will tend to trust a technology as long as they have no reason to mistrust, while users with a lower trusting stance tend to be more skeptical of technology (McKnight, et al., 2011).

The second central aspect of the model, i.e. institution-based trust, includes the two components *situational normality-technology* as well as *structural assurance* as defend by McKnight and colleagues (2011). Situational normality in general can be describes as follows: When one is comfortable in a specific situation and views this as normal, then one is more likely to extend trust to something new within this situation. Situational normality-technology thus describes beliefs about the normality of using a specific technology within a specific setting. Someone who is comfortable using a specific technology in one setting or situation is more likely to trust this technology within another setting, than someone who is uncomfortable with using this technology in any situation. Structural assurance, on the other hand, describes beliefs about infrastructural support. This factor helps to foster individual confidence in a technology through legal or physical support and regulations when using a software.

Moving from left to right through the model (figure 10), the beliefs become more and more specific to a certain technology. While propensity to trust technology is very broad and general, institution-based trust is already more context specific, referring to a specific type of technology. However, both these aspects of technology trust refer to initial trust and do not yet

explain trusting beliefs in a specific technology or device. The final aspect of the model, thus, is the knowledge-based trusting beliefs about a specific technology. These beliefs are formed through use of a technology and were defined by McKnight and colleagues (2011) based on technology specific attributes. In their model they define three specific antecedents of trust: *Functionality, reliability* and a *help-function.*

Starting with the construct of *functionality,* McKnight and colleagues (2011) derived this factor by assessing which aspects of a technology come close to matching the interpersonal trust antecedent of ability. They argue that while technology cannot have an ability, it can be equipped with necessary functions. An individual that perceives a technology to have all necessary functions, will be more willing to trust it, as the perceived chance of the technology not performing the required tasks is low. In the context of exercise apps this might include such functions as monitoring and tracking physical exertion, heart rate, GPS tracking or generating individual training plans. The range of functions within sport and exercise apps is broad, targeting different audiences. However, in every case the application must contain the right functions if a user is to consider it to be trustworthy.

The second antecedent defined by McKnight and colleagues (2011) is the construct of a good *help-function* (rather than benevolence): The model specifies that technology cannot act in a benevolent or malevolent way. However, in terms of general usability, in can be easy to use and have a help-function to consult in case of uncertainty. If a user encounters a problem with the software, a help-function will enable the user to solve his problem and thus they would perceive the software as more trustworthy and supportive. In the case of a fitness app, for example, it is important for the app to have a help-function, explaining certain settings, functions and menus of the app. A user should be able to use the app independently, without further introduction or explanation, in order to find the app to be trustworthy.

Thirdly, the model defines *reliability* (rather than integrity) as an antecedent of trust in technology: As technology has no volition, it is not a question of the technology acting in an integer way, relying that it will function as intended out of the goodness of its heart. Rather, it is important to rely on the technology to consistently perform at its best. If a technology is unreliable and fails to perform consistently, a user is less likely to trust it, regardless of whether the malfunction occurs due to malicious intent (as with a person) or due to faulty software or hardware. When using a training app guiding the personal exercise regimen, it is important to be able to rely on it continually functioning and assessing the current fitness data in a correct way. When, for example, tracking a running course with GPS, it is important for the GPS track to be reliable in assessing the current distance.

All three factors together, i.e. the perceived functionality, perceived reliability and perceived help-function, make up the specific trusting beliefs, defined as a second order construct by McKnight and colleagues (2011). Thus, technology users with higher trusting beliefs in a specific technology, will have higher beliefs about the functionality, reliability and help-function. The model predicts that these specific trusting beliefs in a technology will predict continued and deep structure use of a technology.

Overall, McKnight and colleagues (2011) developed a model of trust in a technology, incorporating both initial trust and as knowledge-based trust as well as predicting technology adoption and continued use. The model was initially developed and validated for spreadsheet software, but with the goal of having a broadly applicable model. The following paragraphs highlight the advantages of this model compared to other conceptualizations of trust in technology, first in general and then specifically for the current research question.

5.4.2. Advantages of this Model

One of the main advantages of this model lies within its special development for technology. Orlikowski and Iaconno (2001) call for a stronger focus on the IT artifact itself in their comment on the status quo of IT research. In their paper, they discuss different understandings of technology and roles technology can play, e.g. technology as tool for labor substitution or a proxy for communication. They emphasize the importance of understanding the specific attributes of technology, as well as the importance of basing research and theories on existing literature. The McKnight and colleagues' (2011) model addresses these aspects: By specifically developing a model of trust in technology based on the trust-related attributes of the technology itself, the first call is answered. The second demand is also met, as the model was developed through extensive literature review. McKnight and colleagues (2011) discuss existing literature on interpersonal trust models, as well as existing models of trust in automation and technology. They relate those models and constructs to specific attributes and traits of technology itself.

In addition to the theory-based development specific to technology, another advantage of this model is that it focuses on initial trust, as well as knowledge-based trust. This is advantageous as it has a broader applicability and can better explain technology use throughout various stages of engagement. This makes McKnight's model preferable over other models, which focus only on initial trust, e.g. the model of trust in technology developed by Söllner and colleagues (2012). They found that their model of initial trust was not stable and the relevance of their constructs changed over time. Once participants were familiar with a technology, the model by Söllner and colleagues (2012) lacked explanatory value. By integrating both initial

trust and knowledge-based trust, McKnight and colleagues (2011) are able to explain both the initial adoption of a technology, and the deep structure exploration and continued use of it.

Furthermore, the McKnight and colleagues (2011) model is more comprehensive, as it incorporates both trusting beliefs about the technology itself, as well was trusting beliefs about technology in general and in the developers of the technology. The model includes a general propensity to trust, relating to interpersonal trust research, as well as situational normality of technology use and institution-based trust. This inclusion better reflects the complex nature of the trusting relationship with technology. Other research argues the necessity of considering complex and multiple trusting relationships within the context of technology trust: Söllner and colleagues (2012), for example, highlight the importance of considering not only the technology, but also the developers behind the technology. Gefen and colleagues (2008) emphasize the relevance of considering not only trust in technology, but also trust in the internet, when researching e-commerce. Overall, most researchers agree that trust in technology is a complex construct, with many aspects playing a role. McKnight and colleagues (2011) developed a model which considers these complex relationships, by incorporating not only the trust in the technological artifact itself, but also the developers, institutional assurances and a general trusting propensity into the model.

Finally, there is one last advantage of this model, in particular for the current research question and model. It lies in the similarities of the model of trust in technology with the Mayer and colleagues (1995) model of interpersonal trust. As the model of trust in technology was adapted from the interpersonal trust model, the antecedents are comparable, yet context and trustee specific. The current research focuses on examining interpersonal trust through digital communication technologies, as well as trust in the technology and possible transfer effects. The close relation of the two models allows an easy transfer from one model to the other. The specific research model, as well as research questions will be presented and discussed in the following chapter six. The chapter will bridge the gap between the separately discussed constructs of the coach-athlete relationship, trust research, digital communication as well as trust in technology. The various constructs will be integrated into a research model, and specific research questions will be derived from that model.

6. Deduction of a Research Model and Research Questions of Trust in the Coach-Athlete Relationship

Now that the previous chapters have given an in-depth overview over all relevant constructs, the current chapter focuses on bringing them together, developing a new model of (digital) communication within the coach-athlete relationship and developing research questions guiding this dissertation. Thus far, the coach-athlete relationship, the importance of trust within this relationship, models of trust, the role of digital communication and technology, as well as trust in technology have each been introduced separately.

Summing up the research discussed thus far, the following can be said: Jowett's (2007) model of the coach-athlete relationship will be implemented to determine relationship quality. This model clearly shows that trust within the coach-athlete relationship is important, without providing an in-depth conceptualization of trust. For this reason, the current research, implements the model of interpersonal trust by Mayer and colleagues (1995), in order to measure trust and conceptualize how trust emerges within the coach-athlete relationship. The importance of communication, both face to face, as well as digitally mediated, has also been highlighted. As technology advances and the process of digitization takes hold of many aspects of society, new forms of communication technologies are incorporated into the coach-athlete relationship. Communication does not occur solely within a face to face setting but is sometimes mediated through digital communication technologies. Therefore, it is important to consider the role of this technology: As seen in the previous chapter, technology can hold a mediator role, affecting how coach and athlete perceive each other, as well as hold the trustee role, wherein coach and athlete trust the technology itself. The current research addresses both those roles technology can hold, examining its mediating effect, as well as the trust in the technology itself. With regard to trust in technology, the trust model of McKnight and colleagues (2011) will be implemented.

These separately discussed constructs interplay within the relationship through the following scenario: As new technologies and devices emerge, they are incorporated into the coach-athlete relationship. Tracking technology for self-quantification, monitoring and evaluation can be implemented by coach to follow an athlete's athletic development. Communication technologies are used to mediate the communication between coach and athlete. Where once face to face meetings were necessary to discuss the newest training regimen, a touch of a button might be enough. For example, an athlete might use a wearable such as a GPS tracking watch to track objective training data (i.e. distance, pace, elevation change and often heart-rate). This training information can be uploaded into a digital training

platform, where it is communicated to coach. Through an instant messaging function, coach and athlete can communicate about the completed training and coach can update and correct the training regimen for the next sessions. Through such a system, a national coach can train and communicate with several athletes spread across the entire country, using digital training platforms, wearables and apps, with face to face contact occurring only sporadically.

While this might work well to communicate the objective data and training plans, research thus far has not examined how this form of communication and interaction affect the coach-athlete relationship in general, and trust specifically. Furthermore, it remains doubtful how well these technologies are equipped to deal with interpersonal conflicts or relationship issues. Thus, the main research question guiding this dissertation is the following:

How do digital communication and digital interaction affect the development of trust within the coach-athlete relationship?

This question has not yet been researched. Yet, it is necessary to understand how digital interactions affect the development of trust. Answering this question can provide valuable input to both researchers and practitioners. A model of how trust emerges through digital interactions can provide future research with testable hypotheses and new avenues for understanding the complex relationship. With regard to practice, the model can provide coaches with valuable information and feedback on how to incorporate digital communication into their work with athletes, to reap the benefits without suffering possible detrimental effects. In order to examine this research question, the models of interpersonal trust and trust in technology are integrated into one model, combining both the mediator and trustee role of technology (Figure 11).

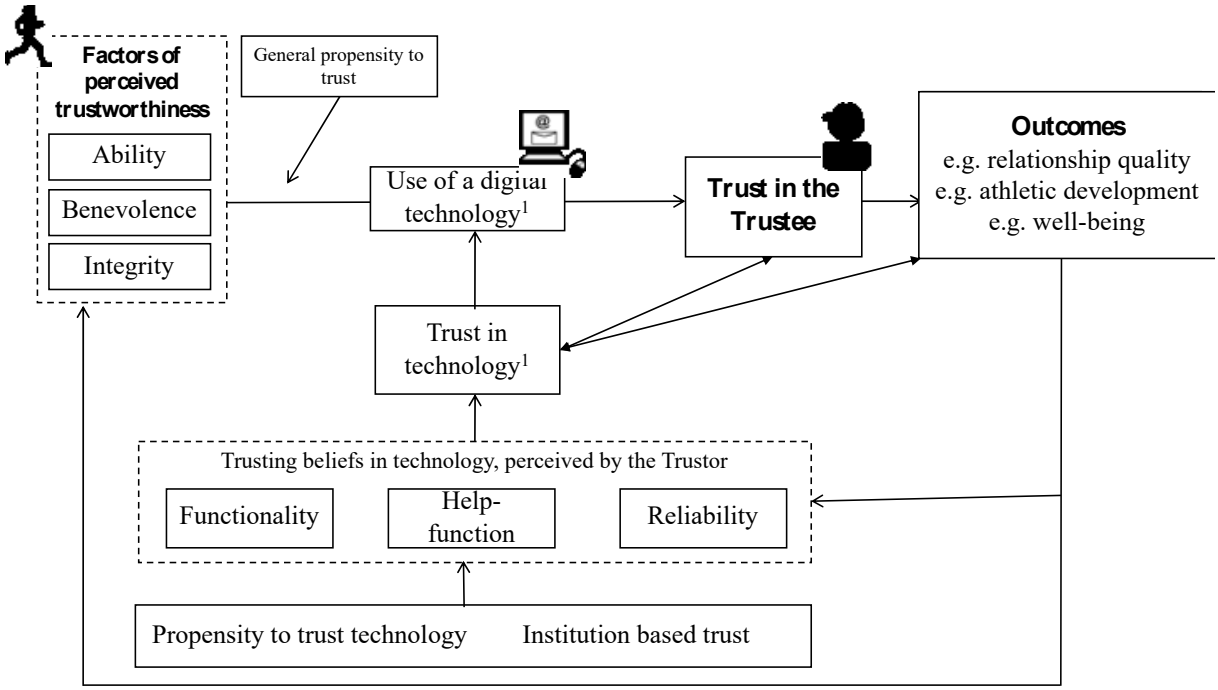

Figure 11. Model of trust in the coach-athlete relationship through digital technology. [1]Technology in this model refers to any type of technology used, ranging from simple e-mail communication, to communication through instant messenger, app, training platform or wearable.

The model is an adapted version of the Mayer and colleagues' (1995) model of interpersonal trust. The trustor (either coach or athlete) assesses the trustee's ability, benevolence and integrity and, based on their individual propensity to trust, they will either trust the trustee, or not. This is a form of cognitive trust, based on previous interactions and experiences with coach. The outcomes of trust within this model are derived from the coach-athlete relationship model by Jowett (2007), as well as research discussed previously by Dirks (2000), Nikbin and colleagues (2014), as well as Zhang and Chelladurai (2013), examining potential outcomes of trust in coach. In general, the model is applicable to either coach or athlete in the trustor role, with the relevant outcomes of a good, trusting relationship affecting both coach and athlete. As in the original model, there is a feedback loop, from the outcomes back to the assessment of ability, benevolence and integrity, highlighting that trust is an adaptive and ever-changing process.

Newly integrated into the model is a model of trust in technology based on the McKnight and colleagues (2011) model. Located in between trustor and trustee, the model highlights the mediator role technology holds within the communication process. The use of a digital technology can influence the perception of the trustee's ability, benevolence and integrity, and thus influence trust. In this way, the digital technology in the mediator role changes the way

trust is typically developed between coach and athlete: The digital context of interaction and communication offers different input and can influence the perception of the trustee's trustworthiness.

However, technology in the trustee role is also incorporated into the model: The specific trusting beliefs in technology are the perceived functionality, reliability as well as the help-function of the specific technology. These are, as in the original model, influenced by a general propensity to trust technology, as well as institution-based trust in the software developers. In this way, technology in the trustee role can be assessed as well, taking a closer look at how trustors perceive the use of digital training technologies and in what way they trust or do not trust the technology. The model proposes that the relationship outcomes are directly and indirectly affected by trust in technology. In turn, the outcomes affect the perceived antecedents of trust in technology, similar to the way the antecedents of trust in coach are affected.

This novice approach of integrating two existing trust models into one another, allows specific hypotheses to be formulated about the interaction and relationship of the different trustees. The main advantage of this integrated model is that it allows researchers to address multiple trusting relationships within one model, as well as their interrelation. Previous research has highlighted the importance of considering the complex nature of trust online: Within the online context, multiple trusting relationships exist, i.e. interpersonal trust, trust in the internet, trust in a communication technology, as well as the developer of this technology (Beldad, et al., 2010; Söllner, et al., 2016). The current model addresses these points, by integrating two types of trust, i.e. trust in a communication technology, as well as interpersonal trust.

In general, it is vital to consider both sides of the coach-athlete relationship: It is important for both the athlete to trust their coach, as well as for the coach to trust their athlete (Jowett, 2007). The model is designed in a way to consider both sides of the relationship and explain both how athlete trust in coach, and how coach trust in athlete is developed through digital communication. However, for the current research, the focus will be on the athlete's perspective, i.e. how the athlete's trust in his or her coach is affected. In order to fully understand the relationship from this perspective, a narrowed focus is important, highlighting specific aspects in depth, rather than a broadened focus, but missing the details. Therefore, the research questions henceforth focus on this side and the relationship and describe only the athlete's perspective. For future research, the model can easily be transferred and adapted to depict the coach's perspective, by switching the roles of coach and athlete in the model.

Using the model as a starting point and considering the athlete's perspective only, it is now possible to derive more specific research questions, addressing specific aspects of the

model. By testing specific relationships, correlations and predictions of this model, the viability of it can be assessed. It is the aim of the current research to address both the mediator and moderator role of technology separately, as well as in combination, examining interaction and trust transfer effects.

Research question one

This first research question addresses the mediattor role of technology. Because coach and athlete do not interact directly, but digitally mediated through a communication or training technology, the direct perception of coach is not possible. Rather, the current model suggests that the perception of trust in coach is mediated through digital communication. Thus, the perception of coach's ability, benevolence and integrity are influenced by the digital context. This is in line with previously discussed research suggesting that the context of communication influences the perception of the communication partner (McFarland & Ployhart, 2015), as well as with research suggesting that online trust mediated through technology has different antecedents (e.g. Corritore et al., 2003; Jarvenpaa et al., 2017). Thus, the first specific research question is as follows:

> **Research Question 1:** How does digitally mediated communication affect the perception of coach's ability, benevolence and integrity?

This specific aspect has yet to be examined within the context of coach-athlete relationships. No research has specifically examined how coach is perceived through the use of digital training technology and digital communication technologies. As there is so little previous research to lean on, the direction of possible effects is still uncertain. It is unclear, whether digital communication would be detrimental or beneficial to the development of trust. For example, it is possible that the implementation of digital communication is beneficial to the development of trust, if the increased availability of coach is interpreted by athletes as higher benevolence? Or else it is plausible, that athletes might perceive their coach as being more able to perform his or her coaching obligations, if coach implements technologies supporting the diagnostic and evaluative process? On the other hand, the digital communication might be detrimental to the development of trust, if the poorer communication media leads to athletes not being able to perceive coach benevolence or integrity. Similarly, the higher latency of digital communication might lead to athletes perceiving coach as less benevolent. As this research question has yet to be examined, it is difficult to predict the exact effects digital

communication would have on the development of trust and the perception of coach's trustworthiness.

In order to address this first research question, an experiment will be conducted. Due to the lack of prior research, the aim of this experiment will be broad and descriptive, gaining a first insight into this relationship and examining the same communication within different contexts, i.e. within a personal face to face context, as well as a digital context. In an experimental design, the development of trust in coach will be examined over time within both purely digital and purely face to face contexts. Using McFarland and Ployhart's (2015) stimuli to describe these scenarios, the digital context is characterized by a lack of shared physical space, high latency and low synchronicity of communication. At the same time, coach is more accessible, yet also more anonymous and the interactions are characterized by low interdependence. On the other end of the continuum, the face to face context is characterized by a shared physical space, low latency and high synchronicity. Coach is not anonymous, yet is also not as accessible, in that athletes have no way of reaching him outside of the face to face settings. These two extreme points of the continuum will be compared, and the impact of each context on the perception of coach's ability, benevolence and integrity will be examined. Thus, the study aims at addressing the question of how technology in the mediator role can affect the development of trust. The experimental manipulation allows the examination of the two extreme-points of the continuum of communication contexts.

Research question two

The second research question aims at addressing the trustee role of technology and validating the model of trust in technology. In order to be able to fully understand the impact and importance of trust in technology, it is important to be able to reliably and validly measure trust in training technologies. In their review, Beldad and colleagues (2010) argue that trust antecedents within the context of online trust are domain- or even transaction- specific, which is why they stress the need for future research to examine trust antecedents specific to a certain context. The current research aims at addressing this call for the context of training technology use. It is important to transfer the existing model of trust in technology to the context of training technologies, to assess its applicability. The specific research question thus goes as follows:

> **Research Question 2**: Do functionality, reliability and help-function accurately, validly and reliably measure trust in digital training technologies?

Thus far, no research has applied the model of trust in technology to the context of digital training technologies. The current research will be the first to do so. The model suggests that trust in the digital training technology is a function of specific trusting beliefs, as well as intuition-based trust and a general propensity to trust technology. The general propensity to trust technology is a very broad construct which is expected to be applicable, regardless of the specific technology under scrutiny, as it is a general propensity. The construct of institution-based trust will be adapted to the broad and general context of exercise technologies, wearables and fitness apps. While this is a very broad category, it is assumed that these technologies share a core: These technologies are all about monitoring, tracking or evaluating exercise behavior. In this case it does not appear relevant whether these technologies are used within an exercise or elite sport setting, or whether these technologies track GPS or heart rate. The specific trusting beliefs are based on the perception of the technology's functionality, reliability and help-function. They will be assessed based on specific, individual technologies implemented by the participants of the survey. In order to address the research question, a series of online and offline surveys will be implemented, assessing the trusting beliefs of different exercise app users. Using the data gathered through the survey, structural equation modeling and confirmatory factor analysis will reveal whether the model is applicable to the context of different sport and exercise technologies.

Research question three

Having examined interpersonal trust, as well as trust in technology separately, the final step will be to examine the interaction of the two constructs. The final research question addresses the back end of the model, which suggests a reciprocal relationship between trust in coach and trust in technology: The model proposes that the trust in coach is influenced by trust in technology (or lack thereof), while the trust in the technology can be affected by the trust in coach (or lack thereof). This assumption is based on research on trust transfer effects, indicating a positive trust transfer from one trustee to another (e.g. Lee, Kim, & Ahn, 2011; Stewart, 2003). Thus far, no research has addressed the transfer of trust from technologies to people, nor has trust transfer been examined within the coach-athlete relationship. While it would be interesting to look at trust transfer occurring in both directions, the current research will focus on only one direction of trust transfer, i.e. from the technology to the coach. The specific research question goes as follows:

Research Question 3:

a) Does trust transfer occur from the technology to coach?

b) If so: Which trust in technology antecedents have an impact on trust in coach?

The focus was chosen in this direction, in order to assess whether the implementation of a training technology by coach can have an influence (positive or negative) on the coach-athlete relationship. With regard to practical implications for coaches, this direction of trust transfer appears more relevant, especially if negative trust transfer effects are observed. It is important for coaches, wishing to implement a new training technology into the coach-athlete relationship, to be aware of the effects this may have on the athletes' perception of their own competence specifically, or their trustworthiness in general.

The final research question will be based upon findings from the previous studies, for example incorporating a valid measure of trust in technology into the research design. In order to test the existence of trust transfer effects, a third method will be implemented: A vignette study will be implemented, in order to test specific hypotheses about the direction of the relationship and specific mechanisms of trust transfer. Specifically, the vignettes will be designed so that the functionality, reliability and help-function of a training technology implemented by coach can be manipulated. By assessing coach's trustworthiness before and after the introduction of the vignette, valuable insight about the impact of technology on coach's trustworthiness will be gained.

Overall, these three research questions address different aspects of the proposed model, giving a comprehensive overview over the viability of the proposed model. By implementing a range of different methods, insight can be gained from different perspectives. Research question one will be addressed through an experimental design, manipulating the communication context in order to determine its impact on the perception of coach. In study two, a survey design is implemented, in order to evaluate the applicability of a theoretical trust in technology model to the in vivo context of actual fitness app usage. Finally, the third study implements a vignette design, in order to theoretically construct different scenarios to determine the impact of trust in technology on trust in coach.

II Empirical Studies

7. Study 1: Trust in Coach within Digital and Face to Face Context

7.1. Specification of Hypothesis

As previously discussed, communication between coach and athlete plays an essential role in developing and maintaining this vital relationship, as well as developing and maintaining trust within the relationship. New technologies and apps are changing the traditional way of communication. Both within an elite sport setting, and within an exercise sport setting, digital training platforms are supplementing, or in some cases might even be replacing, traditional face to face communication between coach and athlete.

The goal of study one is to examine whether the benefits of digital communication (e.g. connecting coaches and athletes across great distances) outweigh potential detrimental effects on the relationship (e.g. lack of trust or close relationship). In order to address this question, the study examines how trust is developed both within face-to-face communication, and within digitally mediated communication between a coach and their athlete. Specifically, the study examines how athletes perceive a coach's ability, benevolence and integrity, depending on whether they communicated digitally or traditionally face-to-face.

Integrating this research question into the previously discussed model of trust development within the coach-athlete relationship, the moderator role of technology is examined within this research: The study addresses the question of how technology moderates the interaction between a coach and an athlete, i.e. how interpersonal trust within the context of online communication is developed.

Research has found that the antecedents of trust through digital communication are, to a large part, similar to the antecedents of trust through interpersonal communication (Corritore, et al., 2003). As such, the antecedents identified by Mayer and colleagues (1995), i.e. ability, benevolence and integrity will be the focus of the current research. These have been previously applied to the coach-athlete relationship and have been shown to be useful in predicting trust in coach (Zhang & Chelladurai, 2013).

Yet, apart from those general antecedents, many studies have examined context and situation specific trust antecedents within globally distributed work-teams or e-commerce and e-government: For example, Jarvenpaa and colleagues (2000) identified size and reputation as important antecedents for trust in an online store, while Maznevski and Chudoba (2000) found regular face to face meetings to be important to develop trust within virtually operating work teams (as discussed in Chapter 4). However, overall the findings of trust through digitally mediated communication vary strongly from research to research. While the studies discussed have identified important antecedents within those specific contexts, the applicability of

antecedents within digital work teams to the coach-athlete relationship remains questionable. Additionally, no study has yet specifically compared the perception of the same antecedents (i.e. ability, benevolence and integrity) within two different (i.e. digital and face to face interactions) settings.

Therefore, it is the goal of this study to address these gaps: On the one hand, the current study will examine the applicability of the antecedents ability, benevolence and integrity to both interpersonal and digitally mediated coach-athlete interactions. On the other hand, the study will compare the perception of ability, benevolence and integrity within those two contexts, in order to determine if there are differences. In order to better understand why differences in the perception of the trust antecedents can emerge, some key aspects of the previously discussed research will be highlighted once again.

Trust is a dynamic construct, which emerges slowly over time (e.g. McKnight, et al., 1998). It is therefore necessary for athletes to gather enough information about coach, in order to assess their ability, benevolence and integrity. In accordance with research on media richness and social presence theory, face-to-face communication is considered to be the richest media, with the highest degree of social presence (Daft & Lengel, 1986; Kapplan & Haenlein, 2010). Thus, it can be assumed that within the face-to-face setting, athletes are able to acquire the most information about their coach's ability, benevolence and integrity. Previous research indeed corroborates this assumption, by indicating that rich media and high social presence are beneficial to the development of trust (e.g. Hakonsson, et al., 2016). Digital communication, on the other hand, is considered to be lower in richness (Daft & Lengel, 1986). Thus, it can be assumed that it is harder for coaches to transport the relevant cues indicating their ability, benevolence and integrity through digital communication. The conclusion would be that trust is developed more slowly though digital communication within the coach-athlete relationship.

However, research on these theories also offers conflicting results, making it difficult to formulate a directed hypothesis about the expected outcomes for trust in coach. The research on media richness has found that not only the degree of media richness is important for the development of trust, but rather the degree of accordance between required media richness of a certain task and actual media richness (Biocca, et al., 2003). If, for example, a task requires low media richness and low social presence, digital communication would be expected to be detrimental to the development of trust. If, however, a task requires high media richness and high social presence, digital communication would be detrimental to the development of trust. Thus, it is important to examine the degree of media richness required for a task within the coach-athlete relationship.

Besides media richness, research has looked at specific interventions to foster trust in digital environments. Many studies have also suggested, that a mixture of face-to-face as well as digitally mediated communication will yield the best results: Implementing initial face-to-face sessions at the beginning und digital teamwork lead to higher levels of trust (e.g. Jarvenpaa, et al., 1998; Maznevski & Chudoba, 2000;). Thus, the current study will adopt this into the research design: Apart from purely digital and purely face to face interactions, one experimental group will have both face to face, as well as digitally mediated communication with their coach. On the one hand, this is a more realistic experimental setting, as purely digital coach-athlete relationships are often still the exception. While some athletes choose their coach solely based upon online profiles and through digital interactions, the majority of athletes usually have some face–to-face contact with coach. On the other hand, this will offer valuable insight into whether or not this is a viable and beneficial intervention for those rare purely digital relationships.

Because of conflicting results and the fact that research has yet to specifically address the effect of context on the constructs ability, benevolence and integrity, it is difficult to formulate specific, directed hypothesis. Yet, an attempt will be made to more clearly describe and explain the expected effects of the different communication contexts on each of the trust antecedents:

Perception of ability. According to Mayer and colleague's (1995), the trust antecedent ability describes the degree to which the trustee is capable of fulfilling the required task. This antecedent is assessed situation specific, i.e. not all abilities are assessed, but only those which are necessary for the task at hand. Within the context of this study, coaches are required to be able to develop a training program to improve running time and adapt this program to the progress of the athlete. Besides these sport-specific skills, athletes may also expect their coach to have certain soft skills required for adequate coach-athlete communication, e.g. being empathic and understanding, motivating and supportive, as well as organized and structured. With regard to the coaching skills, the context of communication is not expected to have much impact on the perception: if the training regimen which is communicated is the same within all conditions, this aspect of coach's ability should be assessed the same in all conditions. The mere content of the communication staying the same, it is unlikely that this content will be perceived differently within digital or face-to-face communication. However, some differences might be expected on the other aspects of coach's ability: i.e. empathic understanding, motivation and support. These aspects of coach's ability can be expected to be better conveyed through richer media, allowing nonverbal cues to be communicated. Athletes may not be able to perceive their coach's motivating and supporting skills through purely digital, asynchronous

communication. Face-to-face communication is better equipped for this. Therefore, with regard to the antecedent ability, the following hypothesis is expected:

H1: Coach's ability will be perceived as highest within the face-to-face condition, and lowest within the digital condition.

Perception of benevolence. According to Mayer and colleagues (1995), benevolence describes a positive relationship between trustor and trustee, with the trustee being interested in the trustors well-being. Within the context of this study, athletes would expect their coach to be interested in their improvement, sport-enjoyment and well-being throughout the training. For instance, athletes might expect coach to be sympathetic when they talk about a difficult or unsuccessful training, or else if they are injured or sick and are not able complete their training. If, however, coach does not engage on such subjects, but rather goes on with business as usual, athletes may assume coach to be less benevolent. Research has found that especially early on in relationships, the antecedent benevolence does not differ from integrity (Lewicki & Bunker, 1996; Mayer, et al., 1995). This indicates that benevolence relies on more information in order to be accurate. This information would be particularly difficult to be perceived through poorer communication. Therefore, it is assumed that especially through digital, asynchronous communication, it can be expected to be difficult to convey benevolence. Again, in order to pick up on nonverbal cues, a richer communication medium, i.e. face-to-face communication, is beneficial. Additionally, the increased effort and time a face-to-face meeting requires compared to writing an e-mail might be considered indicative of higher benevolence by the participating athletes. Therefore, with regard to the antecedent benevolence, the following hypothesis can be specified:

H2: Coach's benevolence will be perceived as highest within the face-to-face condition, and lowest within the digital condition.

Perception of integrity. According to Mayer and colleagues (1995), integrity describes the extent to which the trustee adheres to a set of principles acceptable to the trustor. Within the context of this study, athletes might expect their coach to be fair, punctual and keep his or her word. In order to assess integrity, an athlete might look at their coach's training philosophy, past actions of their coach and to what extent coach is consistent within his or her behavior. As with the antecedent ability, it might be expected that certain aspects of integrity are conveyed easily through clear content, regardless of the communication channel. For example, the coach's training philosophy can be conveyed through a face-to-face communication in a similar manor as through an e-mail, at least with regard to the content. If, however, additional cues are important for conveying integrity, then digital communication would be inferior. For example,

non-verbal communication cues, as well as additional information about coach's actions and behavioral consistency might be more easily gained through face-to-face communication. Therefore, richer face-to-face communication appears especially beneficial, as this allows more information about values and consistent actions to be conveyed. It might be difficult for athletes to perceive enough information about their coach, if they only communicate through poorer communication channels. Therefore, again the hypothesis is specified as follows:

H3: Coach's integrity will be perceived as highest within the face-to-face condition, and lowest within the digital condition.

Summing up, for all three trust antecedents, it is expected that a richer communication medium is beneficial to the perception of relevant cues and information. Thus, it is expected that at the end of the four-week training program, more trust in coach will have developed for the athletes communicating face-to-face, than for the group communicating entirely digitally. As for the mixed condition, the installment of an initial face-to-face meeting is expected to mitigate some of the detrimental effects of the digital group, by allowing coach and athlete to personally get to know each other. Thus, the mixed group is expected to either fall somewhere between the face-to-face and digital groups, or else for there to be no difference between the face-to-face and mixed groups. As this has yet to be examined, it is difficult to formulate a specific hypothesis for the exact relationship between the three groups. Therefore, the hypothesis is formulated as follows:

H4: The installment of an initial face-to-face meeting will mitigate the negative effects of digital communication, so that the perception of all three trust antecedents within the mixed communication group will be better than in the digital communication group.

Now that the impact of both face-to-face and digital communication on the perception of each of the trust antecedents has been more clearly described, the following paragraphs focus on describing the method used to examine the underlying research question.

7.2. Methods

7.2.1. Participants

A power analysis was run with G*Power 3.1 prior to data collection, for the main analysis of trust within different contexts. As no previous research exists, a small to medium effect size of $f^2 = 0.08$ and a power of $1\text{-}\beta = 0.8$ were chosen for the between-within MANOVA of trust, revealing optimal sample size to be $N = 54$. Prior to data collection, approval was gained by the local University ethics committee. Participants were then recruited through bulletins in local gyms, running groups, social media, as well as through sports or psychology classes at the University. Participants had to have prior running experience and to be regularly physically

active (at least one day a week as indicated by self-report), to ensure that the training program would not be too demanding. Because of the elaborate study design, a large dropout rate was anticipated, which is why initially $N = 114$ (52 female) participants were recruited for the study, with $n = 94$ (45 female) completing the training and post assessment of trust in coach. Mean age of participants was $M_{age} = 24.22$ ($SD = 7.30$), and participants indicated having $M_{years} = 3.69$ ($SD = 5.65$) years of running experience and ran an average of $M_{km} = 11.07$ ($SD = 12.64$) km a week.

7.2.2. Procedure

Overall, there were three experimental conditions: Participants either received face-to-face communication and had weekly face-to-face meetings, only received e-mail communication, or a mix of both personal (i.e. face-to-face) and digital (i.e. e-mail) communication. The content of all communication was scripted, making the main difference between the conditions the context in which the communication occurred. Coaches received semi-structured scripts for the face-to-face communication as well as pre-written e-mails for all digital communication. The communication protocols involved ice-breaking openers, asking questions about the previous running week and giving new instructions for the next week. Coaches were instructed to paraphrase participants' responses to questions and to explain the different training sessions as well as the goal of each training run.

The same communication was used in the e-mails. Coaches asked about the previous week, responded to questions or comments from participants and explained the next week's training sessions as well as the purpose of the training sessions in the e-mails. All coaches responded to e-mails by participants within 24 hours, answering questions arising during the training week. Additionally, digital coaches were given a website: A realistic website representing the fictitious coach's qualification and working philosophy was developed and presented to participants of the digital and mixed conditions. Each participant had four interactions with coach scheduled. However, due to individual scheduling issues (in the face-to-face condition), or due to unreliable e-mail contact (in the digital or mixed condition), some participants had fewer contacts with their coach. Any participants who interacted fewer than 3 times with their coach were excluded from the study. As some participants (in the mixed or digital condition) had questions and wrote more e-mails, some participants had more contact with their coach. All participants communicated with their coach between 3 and 6 ($M_{contact} = 4.18$, $SD = 0.71$) times over the course of the 4-week training. The face to face conversations lasted up to ten minutes.

Data was collected from September 2016 through June 2017. A cover story was used and participants were told that the goal was to evaluate the training program and to improve running times. Upon arrival, participants were told the cover story and given information on the experimental procedure and then filled out a questionnaire on demographics and general physical activity. They had time to perform their individual warm-up program before running the 3k at maximum performance in groups of one to three participants at a time (measurement of running time t_1). In the week following the pre-measurement, participants received their training program (either via e-mail or via personal conversation) and started the training. If participants were sick or injured, they were told to skip those training sessions, but continue normally with the training program when they were able to. In the week following the last training, participants proceeded to the post measurement.

At post assessment participants first filled out several questionnaires (n = 94, more information on the questionnaires is provided in the measurement section). Then, they ran their second 3k at measurement time t_2 (n = 78, 16 participants did not complete the second run, as they were sick or injured in the week following the last training session). Finally, they were debriefed about the study's true purpose and had time to ask questions about the study and the research goal, before giving another, final, informed consent.

To control for individual aspects of coach's personality a total of three different coaches were used. Two sports science and one psychology student (all female, M_{age} = 21.33, SD = 2.05) were acting the role of coach. Prior to the study, they were trained in how to behave and respond. Participants were matched into the different conditions (i.e. face-to-face, mix, digital), as well as matched to the different coaches (i.e. coach 1, 2, 3) based on their gender and running speed at measurement time one. The goal was to have an equal number of males and females in each group, as well as have the experimental groups matched on running proficiency. Due to individual drop outs (sickness or injury), the final number of participants per coach and condition was not quite equal among the groups (see table 3 for an overview for each subgroup).

All participants received the same, structured running plan, with individual running times. The running plan was developed by a personal trainer with experience in developing individual running programs. Individual running speeds were adapted for each participant according to their time in their initial 3k run. The general structure of each week's training can be seen in table 4.

Table 3. *Descriptive Data for relevant subgroups.*

	Coach1	Coach2	Coach3	Overall
Face to face	*n* = 10 (*n* = 5 female) M_{age} = 27.6 (11.95) $M_{runningtime1}$ = 14:18 (01:29)	*n* = 10 (*n* = 4 female) M_{age} = 22.90 (4.95) $M_{runningtime1}$ = 14:28 (1:59)	*n* = 13 (*n* = 6 female) M_{age} = 22.23 (2.56) $M_{runningtime1}$ = 14:53 (1:33)	*n* = 33 (*n* = 15 female) M_{age} = 24.06 (7.43) $M_{runningtime1}$ = 14:34 (1:38)
Mix	*n* = 10 (*n* = 5 female) M_{age} = 21.9 (2.51) $M_{runningtime1}$ = 14:14 (01:57)	*n* = 11 (*n* = 5 female) M_{age} = 23,45 (4.80) $M_{runningtime1}$ = 13:54 (1:54)	*n* = 9 (*n* = 3 female) M_{age} = 24.89 (4.17) $M_{runningtime1}$ = 15:08 (2:25)	*n* = 30 (*n* = 13 female) M_{age} = 23.37 (4.02) $M_{runningtime1}$ = 14:23 (2:05)
Digital	*n* = 9 (*n* = 5 female) M_{age} = 26.11 (11.81) $M_{runningtime1}$ = 13:40 (01:36)	*n* = 9 (*n* = 5 female) M_{age} = 25.0 (12.14) $M_{runningtime1}$ = 13:29 (1:25)	*n* = 13 (*n* = 7 female) M_{age} = 24.77 (5.48) $M_{runningtime1}$ = 14:53 (2:02)	*n* = 31 (*n* = 17 female) M_{age} = 25.23 (9.43) $M_{runningtime1}$ = 14:08 (1:49)
Overall	*n* = 29 (*n* = 15 female) M_{age} = 25.17 (9.69) $M_{runningtime1}$ = 14:05 (1:39)	*n* = 30 (*n* = 14 female) M_{age} = 23.73 (7.55) $M_{runningtime1}$ = 13:58 (1:47)	*n* = 35 (*n* = 16 female) M_{age} = 23.86 (4.31) $M_{runningtime1}$ = 14:57 (1:55)	*n* = 94 (*n* = 45 female) M_{age} = 24.22 (7.30) $M_{runningtime1}$ = 14:22 (1:55)

Notes: Numbers in brackets are standard deviation; Running time measured as mm:ss

Table 4 *Basic training schedule for all participants.*

	Day 1	Day2	Day 3	Day 4	Day 5	Day 6	Day 7
Week 1	Communication with coach	5km 30% slower than max	Rest day	4x800m 2% faster than max + 400m slow jogging in between 5 Min warm-up and cool-down	Rest day	8km 30% slower than max 3x 100m Sprint	Rest day
Week 2	Communication with coach	5km 30% slower than max	Rest day	5km Tempo run in 9% slower than max 5 Min warm-up and cool-down	Rest day	9km 30% slower than max 4x 100m Sprint	Rest day
Week 3	Communication with coach	5km 30% slower than max	Rest day	2x1600m 3% slower than max + 800m slow jogging in between 5 Min warm-up and cool-down	Rest day	10km 30% slower than max 5x 100m Sprint	Rest day
Week 4	Communication with coach	5km 30% slower than max	Rest day	5x800m 2% faster than max + 400m slow jogging in between 5 Min warm-up and cool-down	Rest day	9km 30% slower than may	Rest day

Notes: max = calculated from the running time the participant achieved in the 3000m run at measurement time t_1

7.2.3. Measurements

To assess trust in coach, a version of Mayer and Davis's (1999) trust questionnaire which had been previously adapted to the context of sports and validated for German language (Dreiskämper, et al., 2016), was used. The questionnaire included items on the trust antecedents ability (6), benevolence (4) and integrity (5), to be answered on a seven-point Likert scale ranging from 1 (disagree entirely) to 7 (agree entirely). In its initial validation study, the questionnaire scales reached good reliability ranging from .82 < Cronbach's α < .87. Furthermore, participants answered self-designed questions of motivation and liking, as well as adherence to the training program. These items were also answered on a 7-point Likert scale. Running time was measured by hand. The improvement in running time was calculated by subtracting the running time t_1 from the running time t_2, a negative value therefore indicating a faster running time at time two compared to time one, while positive values indicate that the participants' second run was slower.

7.2.4. Analysis

Overall scores were calculated for the ability, benevolence and integrity scale for each participant. To assess the reliability of the trust measure, Cronbach's alpha was calculated for each of the three scales. The variables ability, benevolence and integrity, as well as the running time at t_1 and t_2 and running time improvement were tested for normal distribution using the Kolmogrov-Smirnov Test of normality.

In order to assess the main hypothesis, a between-within MANOVA was calculated with the three-way within factor trust antecedent (ability, benevolence and integrity), while the three-way between factor was communication context (face-to-face, mix, and digital). Additionally, gender was added into the calculation as a covariate. Where necessary, Greenhouse Geisser corrections were used.

In further analysis, a paired sample t-test for running time in run one and run two was calculated, in order to assess if the training was successful and participants improved their overall running time. Furthermore, the overall liking of the coaches was compared using a one-way ANOVA, with coach (coach 1, 2, or 3) as the between subjects factor and liking as the dependent variable (measured on 7-point Likert scale from 1, very much, to 7, not at all). To control for individual differences between the coaches on the trust antecedents, the interaction of coach with the factor ability, benevolence and integrity was calculated in a between-within MANOVA with the within factor trust-antecedent (ability, benevolence and integrity) and the between factor coach (coach1, 2, and 3). Again, Grennhouse Geisser corrections were used where necessary.

7.3. Results

Table 5 gives an overview of descriptive data (i.e. means and standard deviations) for the trust scores (ability, benevolence and integrity) and running time improvement per experimental condition. The reliability measured as Cronbach's alpha with this sample revealed good scores for the scales of the trust antecedents ability (α = .92), benevolence (α = .89) and integrity (α = .89).

Table 5. *Mean trust scores, running time and improvement (t_2-t_1).*

	Ability[1]	Benevolence[1]	Integrity[1]	Running time pre-assessment[2]	Improvement (t_2-t_1)[2]
Face to face	M = 5.5 (0.85)	M = 5.46 (1.03)	M = 5.21 (0.92)	M = 14:34 (01:38)	M = - 00:41 (00:51)
Mix	M = 5.59 (1.09)	M = 4.98 (1.38)	M = 5.19 (1.18)	M = 14:23 (02:05)	M = - 00:46 (00:43)
Digital	M = 5.23 (0.91)	M = 4.56 (1.26)	M = 5.10 (0.97)	M = 14:08 (01:49)	M = - 00:38 (00:28)
Overall	M = 5.44 (0.95)	M = 5.01 (1.27)	M = 5.17 (1.01)	M = 14:22 (01:50)	M = - 00:42 (00:41)

Notes: Numbers in brackets are standard deviation; [1]Measured on a 7-point Likert Scale from 1 (strongly disagree) to 7 (strongly agree); [2]Measured as mm:ss

The Kolomogorov Smirnov Test revealed normal distribution for the variables running time t_1 ($D(78) = 0.09$, $p = .19$), running time t_2 ($D(78) = 0.08$, $p = .2$), running time improvement ($D(78) = 0.09$, $p = .19$), and integrity ($D(78) = 0.07$, $p = .2$), while the test indicates the variables competence ($D(78) = 0.14$, $p < .05$) and benevolence ($D(78) = 0.10$, $p < .05$) were not normally distributed.

Nonetheless, the MANOVA was still calculated, as it is robust against non-normal data for samples with N > 30 participants, as was the case (Wilcox, 2012). With regard to the main hypothesis, the between-within MANOVA calculated with the factors trust antecedent and communication revealed no significant main effect of the within-subjects factor trust antecedent ($F(1.65,148.72) = 1.07$, $p = .33$, $\eta^2 = 0.01$). Equally, the main effect of the between subjects factor communication ($F(2,90) = 1.78$, $p = .18$, $\eta^2 = 0.04$) as well as the effect of the covariate gender ($F(1,90) = 0.70$, $p = .41$, $\eta^2 = 0.01$) did not reach significance. The interaction of the within subjects factor trust antecedent with gender was not significant ($F(1.65,148.72) = 1.72$,

p = .19, η^2 = 0.02), while the interaction of the within subjects factor trust antecedent and communication, was significant (F(3.31,148.72) = 4.35, p < .05, η^2 = 0.09), as seen in figure 12. Bonferoni corrected post-hoc analysis indicates that benevolence scored higher in the face-to-face condition when compared to the digital condition (t(62) = 3.16, p < 0.05), while the difference between face-to-face and mix condition (t(53.24) = 1.60, p = 0.12) and mix and digital condition (t(59) = 1.23, p = 0.22) were not significant.

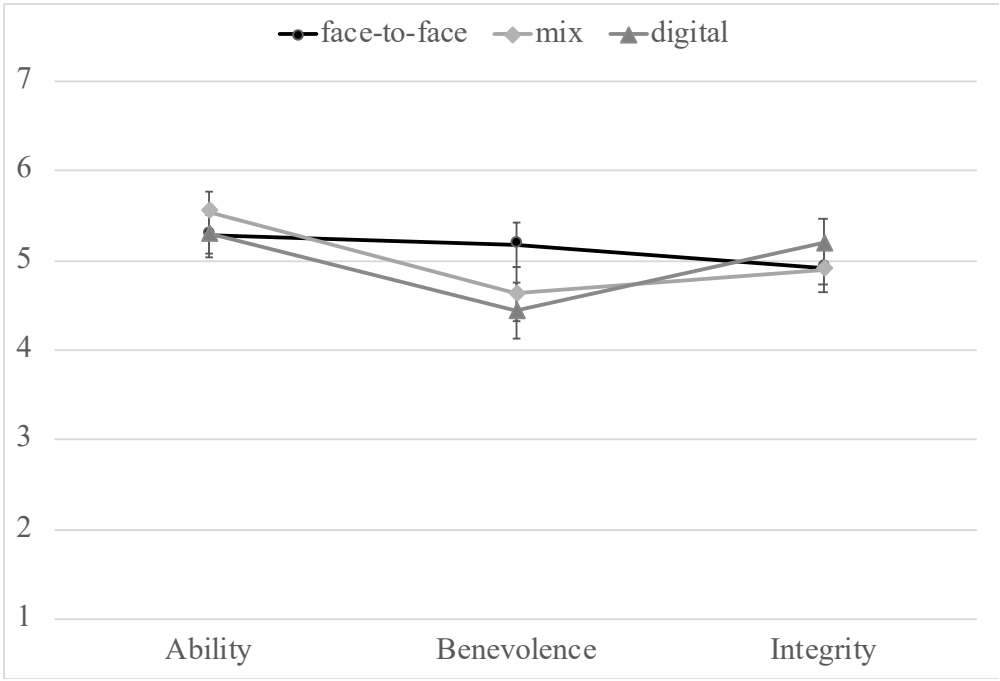

Figure 12. Perceived trust antecedents ability, benevolence and integrity across the communication conditions (face-to-face, mix, and digital).
Variables measured on a 7 point Likert scale from 1 (disagree entirely) to 7 (agree entirely). Error indicators are standard error of the mean

The paired sample t-test revealed a significant difference between running time at t_1 and t_2 (t(77) = 8.94, p < .05, d = 0.39), with participants being on average M = 42sec faster at measurement time two. The one-way ANOVA analyzing overall liking revealed no significant difference in liking (as measured on a seven point Likert scale ranging from 1 = liked very much to 7 = did not like at all) between coach 1 (M = 1.62, SD = 0.79), coach 2 (M = 1.8, SD = 0.81) and coach 3 (M = 1.51 SD = 0.70) with F(2,53.57) = 1.16, p = .32, η^2 = .03. The between-within MANOVA revealed a significant main effect of the within subjects factor trust antecedents (F(1.66,151.14) = 12.61, p < .05, η^2 = .12), showing a significant difference in the perception of the three trust antecedents: Ability was perceived as highest, with benevolence being assessed lowest. The main effect of the between factor coach was significant as well (F(2,91) = 3.44, p < .05, η^2 = .07), indicating as reported above, that coach three scored higher

than coach one, while coach two scored lowest on all three trust antecedents. The interaction of the factor trust antecedent and coach, however, was not significant ($F(3.32,151.24) = 2.22$, $p = .08$, $\eta^2 = .05$), as can be seen in figure 13.

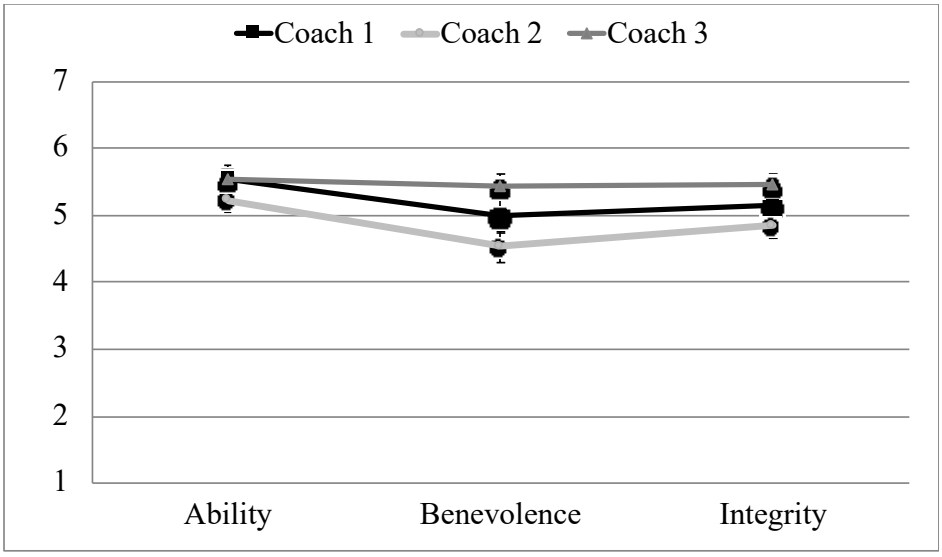

Figure 13. Perceived trust antecedents ability, benevolence and integrity of the three different coaches.
Measured on a 7 point Likert scale ranging from 1 (disagree entirely) to 7 (agree entirely). Error indicators are standard error of the mean

7.4. Study specific discussion

The aim of this study was to analyze how traditional face-to-face versus digital communication contexts affect the perception of coach's ability, benevolence and integrity within the coach-athlete relationship. With new emerging digital communication technologies, it is important to assess how these technologies influence the important relationship between coach and athlete.

The three main hypotheses of this study were that there would be a difference in the development of trust within the different context-conditions of communication. Specifically, it was assumed that all three factors, ability, benevolence and integrity, would be perceived as highest through face to face communication, and lowest through digital communication (H1-3). This effect was expected to be especially pronounced for the antecedent of benevolence, as this factor is typically difficult to judge early on in relationships and requires more time and more interaction to develop clearly (Mayer et al., 1995). The implementation of an initial face-to-face meeting, before switching to digital communication was expected to mitigate the detrimental effects of the digital communication (H4). Yet, the extent of this effect was not specified, due to a lack of prior research

However, the findings do not support these assumptions entirely. The analysis revealed no overall significant difference in athlete's perception of coach's ability or integrity between the different context conditions. Therefore, it is necessary to reject hypothesis one and three. This suggests that indeed, the context of communication did not affect how athletes assessed coach's ability or integrity. Yet, with regard to benevolence, a significant interaction was found: Athletes in the face-to-face condition assessed their coach's benevolence to be higher than athletes in the mix or purely digital group. This suggests that in order to perceive benevolence, it is necessary to communicate directly face-to-face, where more and unambiguous information can be conveyed, confirming hypothesis two. Indeed, research suggests that early on in relationships the factor of benevolence is more difficult to estimate (Mayer, et al., 1995). Only later on in the relationship, as more information is gathered, do we develop a more detailed impression of benevolence, and the factor of benevolence becomes distinct from the factor integrity (Lewicki & Bunker, 1996). In this study, only the face-to-face communication conveyed enough unambiguous information in order to perceive this factor. Both for the mix (which communicated mostly digital) and purely digital group, the factor was not rated highly. The perception of benevolence in the mixed condition was not significantly worse than in the face-to-face condition, yet also not significantly better than in the purely digital condition. Therefore, hypothesis four, that the initial face-to-face meeting would reduce negative effects of the digital communication condition cannot be confirmed.

The findings suggest that for the perception of both ability and integrity, the content of communication is more important than the context in which the communication occurs. The content (regardless of whether it is conveyed digitally or face to face) of the training plans and support and motivation offered through the communication appear to be sufficient to convey adequate information about coach's ability. Similarly, the content of communication conveying information about coach's values and training philosophy is sufficient for athletes to assess coach's integrity as high. With regard to media richness theory and the necessity to convey richer information, one important caveat must be considered: As Straub and Karahanna (1998) have shown, it is not primarily the media richness or social presence, which is relevant for developing trust, but rather the matching of required and actual media richness and social presence. With regard to coach's ability and integrity, low media richness appears to be sufficient. Solely the antecedent benevolence appears to be dependent on gathering information going beyond the content of the communication, relying for example on non-verbal cues. For this antecedent, the perception appears to be dependent, at least to some extent, on the richness

of the communication media, requiring richer media in order to properly convey the necessary information

Another explanation for the lack of a significant difference for the ability and integrity antecedents might lie within the media proficiency of the participants: While media richness has been shown to negatively affect the development of trust, other research suggests that rather it is more a question of being used to a communication medium (Burke, et al., 1999). The perception of a communication medium can change over time, as one becomes used to using it. Furthermore, contextual factors, e.g. norms for technology use, might influence the impact media richness has on the development of trust (DeRosa, Hantula, Kock, & D'Arcy, 2004). Therefore, participants used to communicating via e-mail, or those expecting a coach to communicate via mail would not perceive coach's trustworthiness differently through digital communication. While the actual media proficiency of the participants was not assessed, it can be assumed that most participants have experience communicating via e-mail. All participants indicated having at least finished high school or having a university degree. As e-mail communication is part of everyday life for university students, and also part of most people's working life, it is likely that the participants in this study were used to working with this communication medium, thus mitigating possible negative effects of the poorer medium.

Overall, the results indicate that e-mail communication with coach will not negatively affect the coach-athlete relationship. Furthermore, if digital communication is implemented within an existing relationship, where athletes have already formed a picture of coach's ability, benevolence and integrity, no negative consequences are to be expected. In fact, the benefits of digital communication can be used to connect coach and athlete across distances and enable athletes access to good coaching. If a new relationship is established through digital communication, it will be necessary to invest more effort into conveying benevolence.

Aside from analyzing the main hypothesis, some further analyses were run. Gender was included into the main hypothesis to examine if gender effects were prevalent. In this study, all coaches were female. Some research suggests that male and female athletes perceive female coaches differently and that same sex coach-athlete dyads interact differently than mixed-sex dyads (e.g. Jowett & Clark-Carter, 2006; Jowett & Cockerill, 2002; Jowett & Nezlek, 2011; Tomlinson & Yorganci, 1997). In order to control for this effect, all coaches were female in this study, and the perception of the female coach by both male and female athletes was compared. This different perception, however, could not be confirmed in this study. Neither the main effect of gender, nor an interaction of gender with the communication condition was

significant. Thus, both male and female athletes assessed their coach's ability, benevolence and integrity in a similar manor.

Additionally, individual coach personality was examined, in order to analyze if individual differences or sympathy towards coach had a stronger impact than other factors like the content or context of communication. To control for differences of individual coach personality, three different students were used to act the role of coach. The analysis showed no significant difference in liking between the three coaches. The scores indicate an overall high degree of liking. Thus, all participants were sympathetic towards their coach. None of the three coaches appear to have been more likable than the others. On the three trust antecedents there were individual differences between the coaches, i.e. coach three scored highest on all three antecedents compared to the other two coaches. However, the overall relationship among the antecedents was the same between all three coaches, indicated by the none-significant interaction effect. For each of the three coaches, ability was judged highest, while benevolence scored lowest. This suggests that while some individual aspects of the coaches' personality affected the way athletes perceived their coach, similar aspects in the interaction (i.e. the content and context of communication) appear to have dominated the perception of coach.

Overall, the study offers insight into the perception of coach's trustworthiness, either through face to face communication, or else through digitally mediated communication. However, some limitations must be considered when interpreting these results. One important factor to consider is the way trust was measured. In this study, the participants only trained over a course of four weeks, interacting with their coach between three and six times ($M = 4.18$, $SD = 0.71$). Early trust research argues that trust emerges slowly over time (see e.g. McKnight, et al., 1998), while most recent research agrees that some form of "initial trust" or "swift trust" exists but changes sequentially over time (Jarvenpaa & Leidner, 1999; Schoorman, et al., 2007). In most models, initial trust is seen either as a form of deterrence-based trust (Shapiro, et al., 1992) or calculus-based trust (Lewicki & Bunker, 1996). In both cases, it is assumed that people trust initially, i.e. in the early phases of a relationship, when it is beneficial to the development of working relationships. Only later on in the relationship, as more information is gathered, does trust shift to a knowledge-based trust, where the factors of trustworthiness are assessed individually (Lewicki & Bunker, 1996). In this study, knowledge-based trust was measured in form of perceived ability, benevolence and integrity. However, it is possible that participants relied on initial trust cues, i.e. relied on a form of initial, calculus-based trust: Within the context of the study, it would be justified for participants to calculate coach would be trustworthy, in

order to fulfill the study goal. Thus, it is possible that the high levels of trustworthiness are due to high initial trust, rather than due to an accurate perception of the antecedents.

Another limitation of the study is the lack of risk for participants: Almost all definitions of trust describe the necessity of perceived risk in order for trust to emerge (Mayer et al., 1995; McKnight & Chervany, 2001). The athlete must trust that coach is willing and able to help his or her athletic development. If coach fails to do so, the athlete runs the risk of either not improving or in the worst case even injury due to poor training methods. In this study, the risk for participants was small, as all participants were voluntarily in the study and training for their personal gain, but not for a competition. Therefore, the risk involved for participants was related to investing time in personal improvement, and not achieving a self-set goal. Thus, the consequences of not improving might not have been grave for most participants.

Nonetheless, participants significantly improved their running time by 42 seconds on average. This indicates that most participants did take the training seriously. In the post assessment questionnaire, participants indicated on a 7 point Likert scale (ranging from 1 = very motivated to 7 = not motivated at all) to have been fairly motivated ($M = 1.57$, $SD = 0.70$) and to have been very committed to completing the training conscientiously ($M = 1.4$, $SD = 0.59$, on a 7-point Liktert Scale from 1 = very committed to 7 = not committed at all). So even if external risk was low, most participants had an internal motivation to improve. Still, due to the short period of interaction as well as the lack of a real risk to participants, the results must be interpreted with caution. Especially the applicability of these results to a competitive and elite sport level can be questioned and will be addressed in more detail at a later part in the discussion.

Furthermore, the experimental nature of the design must also be considered: The interaction between coach and athlete entirely via mail is an artificial situation, designed to isolate the effect of digital communication. While, especially within endurance sports such as running or triathlon, this can occur, it is more the exception than the rule. Therefore, the transfer of these results to real life training situations or coach-athlete interactions is limited to those specific situations. However, the goal of the study was to analyze the individual effect digital versus face-to-face context of communication would have on the perception of coach's ability, benevolence or integrity. Thus, the study gives useful insights into the isolated effects of the different communication contexts.

Bearing these limitations in mind, the study suggests that the current findings are most applicable to an exercise sport setting, where risk is low and athletes do not always directly interact with their (digital) coach. The coach-athlete relationship is still important, as it can

influence commitment and motivation (Gagnè, et al., 2003). Especially in an exercise setting, these factors are important for adoption and maintenance of exercise behavior.

It is therefore useful to see that with proper content of communication, the digital context is not detrimental to the development of a working relationship between an athlete and his or her coach. The advantages of the digital context (e.g. higher accessibility) can be utilized to reach people wanting to exercise more and giving them access to expert knowledge, without fearing disadvantages for the relationship. Future research could therefore focus more which content of the communication is important for developing trust, as well as which specific behavior from coach would elicit more trust within the exercise setting. This in turn might lead to more sport commitment, helping more people reap the health benefits of exercise and the guidance of a professional coach. Future research could address these aspects, examining how digital communication and technology use within a sport setting can influence actual exercise behavior and adherence to a training plan.

However, the applicability of the current findings to elite sports must be carefully considered: In highly competitive sports, where the stakes are high and the cost of poor training is much greater, the results may well be different. The more competitive and serious athletes are, the more important the coach-athlete relationship becomes (Jowett, 2007). Especially at a highly competitive level, the risk and therefore the need for a good relationship is much greater (Jowett & Nezlek, 2015). As the risk increases, so does the need for trust (e.g. Mayer, et al., 1995; McKnight & Chervany, 2001). Further research is therefore needed to examine the effects of digital communication on the coach-athlete relationship within this setting. Research suggests that if athletes are used to using digital communication technologies, the digital context would not greatly affect the perception of coach, especially if built on an existing trusting relationship implementing both face to face and digital communication.

Another interesting line of research would be to look at the role of trust in digital technology and which trust transfer effects might occur. Some research suggests that examining online trust also means examining trust in the technology (Beldad, et al., 2010). Especially when communicating sensitive and important training data, security and trust in the technology are important. It would therefore be interesting to look at transfer effects of trust in technology and trust in the communication partner.

Conclusion

Overall, this study showed no difference in the perception of coach's ability, benevolence or integrity within different communication contexts. Both through face-to-face communication and through digital communication, athletes perceived a new and previously unknown coach in

a similar way, i.e. to be fairly able and integer. Face-to-face communication was only necessary for the perception of benevolence to convey the information accurately. This suggests that especially within a sports and exercise settings with lower risks, the benefits of digital communication and training technology can be utilized. Athletes can use the technology to gain access to expert coaches, and build a trusting working relationship to attain their athletic goals. When building new coach-athlete relationships through digital technology, it would be prudent to invest time and effort into conveying benevolence.

8. Study 2: Validation of Trust in Technology for Sport and Exercise Technologies

8.1. Specification of Hypothesis

As previously discussed, research on trust in technology has shown that initial trust can explain why people initially start using a new technology (e.g. Benbasat, et al., 2010; Gefen, et al., 2003), while knowledge-based trust can predict why people continue to use and explore more functions of a technology (McKnight, et al., 2011; Söllner et al., 2016). Thus, trust in fitness or training technologies might explain why people start and continue to use training apps for their personal training, or why athletes are compliant with coach implemented technology use. Trust in a training technology could be an important predictor in explaining why people continue to stay active, or else why athletes adhere to the specified training program, when the technology is implemented within the coach-athlete relationship.

Within this study, training technologies and fitness apps are all such technologies, which allow the collection, tracking, monitoring, or saving and distributing of health and fitness related data. The study includes any type of app, software or program, or device or wearable, which fulfills the described functions. Different types of technologies will be grouped together under the concept of training and fitness technologies: This includes technologies to collect and monitor data, process or communicate the data, or other technologies providing advice and recommendations. The first type, i.e. technologies collecting data, include apps and wearables that for example track GPS data of endurance training, speed or distance, heart-rate data, or other performance related information. The second type, i.e. technologies to process or communicate the data include apps, software or online platforms, wherein data can be stored and shared, for example with a personal trainer. The online platform allows athletes to store and communicate their collected performance parameters, in order for coach to use them to provide new training plans. The third category, i.e. technologies providing advice or information include apps or software programs that actually calculate new training plans or give recommendations based on data they receive from the user. All these technologies will be examined in this study, and subsumed under the term training and fitness technologies.

While the previous study one focused on interpersonal trust mediated through technology and thus addressed the mediator role of technology, study two focuses on technology in the trustee role and thus on trust in technology itself. Within the previously described model of trust through digital communication within the coach-athlete relationship, this study focuses solely on the aspect of trust in technology, while not considering other aspects of the research model.

However, in order to examine the impact, trust in training technology has on the use of this technology and, possibly, on exercise behavior, it is first necessary to determine a valid and reliable model and measurement instrument of trust in technology. As seen in Chapter 5, trust in technology is a complex phenomenon, with varying models and conceptualizations. The starting point for this study therefore is the general definition of trust in technology as determined by McKnight and colleagues (2011). This model of trust in technology has been previously used to predict trust in spreadsheet software and explain intention to use and deep-structure exploration. Yet, it has only been used within that context, and has not yet been applied to the context of sport and exercise technologies.

Thus far, research has shown that trust is considered to be specific to a certain object, situation or context (Gefen, et al., 2003; Söllner, et al., 2016). Therefore, it is important to adjust and modify models of trust in IT artifacts to the specific artifacts under examination (Beldad, et al., 2010; Söllner, Hoffmann, Hoffmann, Wacker, & Leimiester, 2014). Within the context of this study this means that the McKnight and colleagues' (2011) model of trust in technology must be applied to the context of sport and exercise technologies, and its viability for this context tested.

Addressing this call for specific models and measurement methods is therefore the goal of this study. To be precise, the goal is twofold: Firstly, the goal is to validate the German translation of the questionnaire and research model, as this has thus far not been done yet. Secondly, the goal is to validate the model for the context of exercise and fitness apps, as it is necessary to have a valid and reliable measurement instrument.

The model adapted to the context of sport and exercise technologies is the model of trust in technology by McKnight and colleagues (2011). The model specifies that specific trusting beliefs in a technology are dependent on the perception of the functionality, reliability and the help-function of a specific technology. Besides the specific trusting beliefs, the McKnight and colleagues (2011) model includes initial trust specified through institution-based trust, as well as situational normality of technology use. The current study assumes that the model is applicable to this technology. Specifically, it is predicted that the antecedents of functionality, reliability and help-function used in this model will predict trust in a training technology and intention to use the technology. Furthermore, the concepts of institution-based trust and situational normality of technology use are expected to be applicable to this setting as well.

8.2. Methods

8.2.1. Questionnaire translation and adaption

The original questionnaire was taken from McKnight and colleagues (2011) and examines trust in spreadsheet software. The 26 items are answered on a 7-point Likert scale ranging from one (strongly disagree), to seven (strongly agree). The questionnaire consists of seven scales, with three to four itmes per scale. The scales *trusting stance* and *faith in general technology* are organized under the construct *propensity to trust*. The scales *structural assurance* and *situational normality* are organized under the construct *institution-based trust*. Both institution-based trust and propensity to trust are considered to be part of initial trust. The second part of the questionnaire assesses knowledge-based trust through the scales *functionality*, *reliability*, and *help-function*, grouped together to the latent factor specific trusting beliefs.

The questionnaire was translated from English into German. The backward translation into English was performed by a native speaker of English and the original and translated items were compared to minimize deviation of meaning. Where necessary, corrections were made. The goal of the forward and backward translation was to achieve the right connotation of words in the German version of the items. In a second step, the items were adapted to the context of sport- and fitness apps, making them domain specific (see table 6 for all items and their scales). The items of the scales trusting stance and general faith in technology refer to technology in general, and are not specific to a technology, or even to a technology domain. The items of the scales structural assurance and situational normality refer to general beliefs about a domain specific technology. In the original version, the items refer to spreadsheet software in general. In the adapted version, the items refer to fitness and training technologies in general. Finally, the items of the three scales of specific trusting beliefs are formulated in a technology specific way, i.e. they refer to the specific app, or online training platform used by the athletes. In the original questionnaire, the items referred directly to the specific software Excel. As no items were excluded, the final item pool consisted of 26 items.

Table 6. *Trust in technology items and their scales.*

Construct	Scale	Items
Trusting beliefs in a specific technology	Function-ality	1. This App1[1] has the functionality I need. 2. This App[1] has the features required for my tasks. 3. This App[1] has the ability to do what I want it to do.
	Reliability	1. This App[1] is a very reliable piece of software. 2. This App[1] does not fail me 3. This App[1] is extremely dependable. 4. This App[1] does not malfunction for me
	Help-function	1. This App[1] supplies my need for help through a help function. 2. This App[1] provides competent guidance (as needed) through a help function. 3. This App[1] provides whatever help I need. 4. This App[1] provides very sensible and effective advice, if needed.
Institution based trust	Situational normality	1. I am totally comfortable working with exercise apps. 2. I feel very good about how things go when I use exercise apps. 3. I always feel confident that the right things will happen when I use exercise apps. 4. It appears that things will be fine when I utilize exercise apps.
	Structural Assurance	1. I feel okay using exercise apps because they are backed by vendor protections. 2. Product guarantees make it feel all right to use exercise apps. 3. Favorable-to-consumer legal structures help me feel safe working with exercise apps. 4. Having the backing of legal statutes and processes makes me feel secure in using exercise apps.
Propensity to trust	Faith in general technology	1. I believe that most technologies are effective at what they are designed to do. 2. A large majority of technologies are excellent. 3. Most technologies have the features needed for their domain. 4. I think most technologies enable me to do what I need to do.
	Trusting stance general technology	1. My typical approach is to trust new technologies until they prove to me that I shouldn't trust them. 2. I usually trust a technology until it gives me a reason not to trust it. 3. I generally give a technology the benefit of the doubt when I first use it.

Note. The items in this table are the original English items, adapted to the context of sport and exercise apps. The results of the forward-backward translation and the German items used in the study are found in the appendix. [1]Refers to the specific exercise app or technology used by the participants

8.2.2. Sample

For this study, several samples were pooled together. The samples were collected between September 2015 and November 2017 as part of different studies researching trust in training technologies. Table 7 offers an overview of the separate samples and descriptive statistics for each sample.

Table 7. *Overview of the three separate samples.*

Sample	Type	*n*	% female	Mean Age (SD)
1	Online	54	61.8	28.24 (8.36)
2[1]	Online	417	50.5	28.37 (9.69)
3	Paper-Pencil	51	42.0	41.22 (21.43)
Overall	Both	522	52,5	29.95 (12.36)

Note. [1]This sample is part of a larger sample of over 800 participants used for a different dissertation

Participants from sample one and two were recruited through online bulletins, social media postings, direct recruitment and mailing lists. Participants included in sample one and two completed an online questionnaire using the Unipark online survey (https://www.unipark.com/). Sample two is part of a larger sample of over 800 participants used in other studies with a different purpose. However, only the part of the sample with experience in using training technology or fitness apps were assessed for this study, because in order to assess knowledge-based trust, it was important for the participants to have experience with an app or training technology. Other parts of that sample are used for publications on trust in technology, as well as body trust and app use. Participants for sample three were directly recruited in fitness studios and sport and psychology courses and filled out a paper-pencil version of the questionnaire. This sample was collected in order to have participants without experience with training apps. In order to still be able to assess the specific trusting beliefs, participants were given a running app to explore on a mobile device. Participants were instructed to explore the different functions of the app and had the opportunity to investigate the profile and data of an example account. Having had time to explore all the functions of the app, participants were handed a paper-pencil version of the questionnaire to fill out.

Overall, $N = 522$ (52.5% female, 24.9% male, 22.6% without specification) participants filled out the questionnaire on trust in technology. Participants' mean age was $M_{age} = 29.95$

(SD_{age} = 12.36). Almost all participants (92.7%) indicated being regularly physically active for on average M_{days} = 4.13 (SD_{days} = 1.58) days a week for M_{hours} = 6.53 (SD_{hours} = 5.90) hours. Over half of the sample (57.8%) was currently using an app for their physical activity, 35,7% used to use apps for their physical activity but stated to not currently be using one, while only 6.5% indicated to have never used an app for physical activity before.

8.2.3. Analysis

Descriptive analysis. For each of the seven scales, mean scores and standard deviation were calculated overall, as well as for each of the sub-samples. For the general trusting beliefs, mean scores were calculated over the scales reliability, functionality and help-function, and calculated to the entire sample, as well as for each sub-sample.

Validity and reliability. In order to evaluate the measurement and structural models, a multi-step procedure was chosen. In the first step, the separate measurement models for knowledge-based trust and initial trust were evaluated. The second step was to assess the criterion validity by calculating the entire structural model and assessing its model fit. All calculations were performed in R (R Core Team, 2016). Both for the confirmatory factor analysis, as well as for the structural equation modeling, the package lavaan (Rosseel, 2012) was used. Maximum-likelihood estimation was used to estimate all models. Model fit was assessed using the Robust Comparative Fit Index (RCFI), Robust Root Mean Square Error of Approximation (RRMSEA), as well as the Standardized Root Mean Square Residual (SRMR) (Hu & Bentler, 1999). For the RCFI, thresholds of > .90 and > .95 are indicative of acceptable and very good model fit respectively (Little, 2013). Values of ≤ .08 were indicatice for acceptable and ≤ .05 were indivative of a good model fit for the RMSEA (Little, 2013), and values of < .06 are indicative of acceptable model fit for the SRMR (Hu & Bentler, 1999).

Step one – Evaluation of the measurement models. In order to assess the measurement model of knowledge-based trust, the model of the trusting beliefs in a specific technology was evaluated using confirmatory factor analysis. Figure 14 depicts the specified model, of knowledge-based trust, measured as reliability, functionality and help-function. In a second step, the separate measurement model of initial trust was evaluated using structural equation modeling for the constructs of propensity to trust and institution-based trust, as depicted in Figure 15. While McKnight and colleagues (2011) do not explicitly state the covariance between the latent variables “Structural assurance” and “Situational normality” as well as between the variables “General Faith” and “Trusting Stance”, a covariance was assumed, as the pairs of variables each are part of a broader concept, i.e. institution-based trust and propensity to trust, respectively.

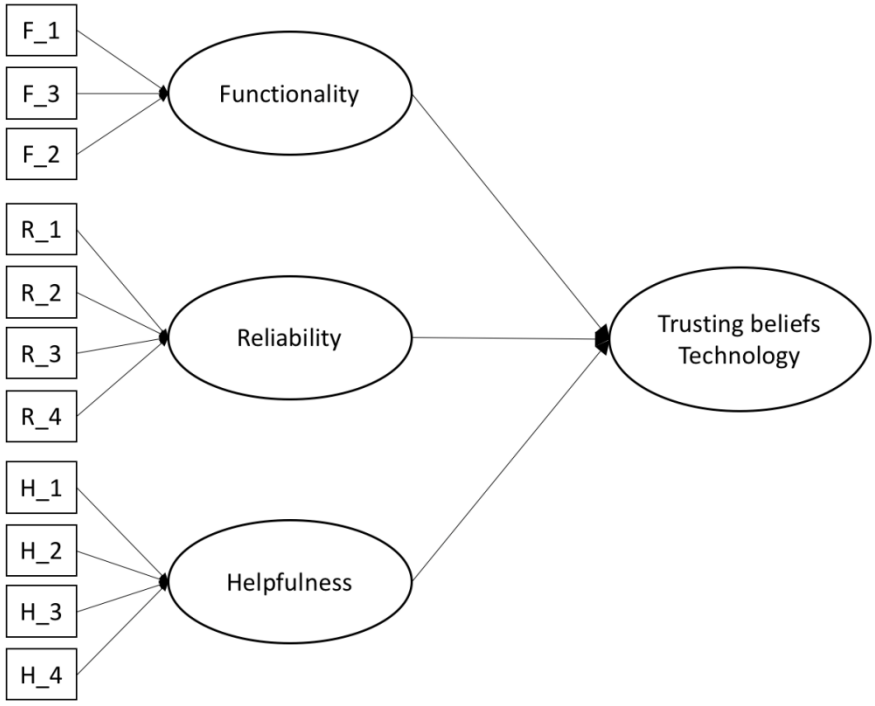

Figure 14. Measurement model of knowledge-based trust in a specific technology.

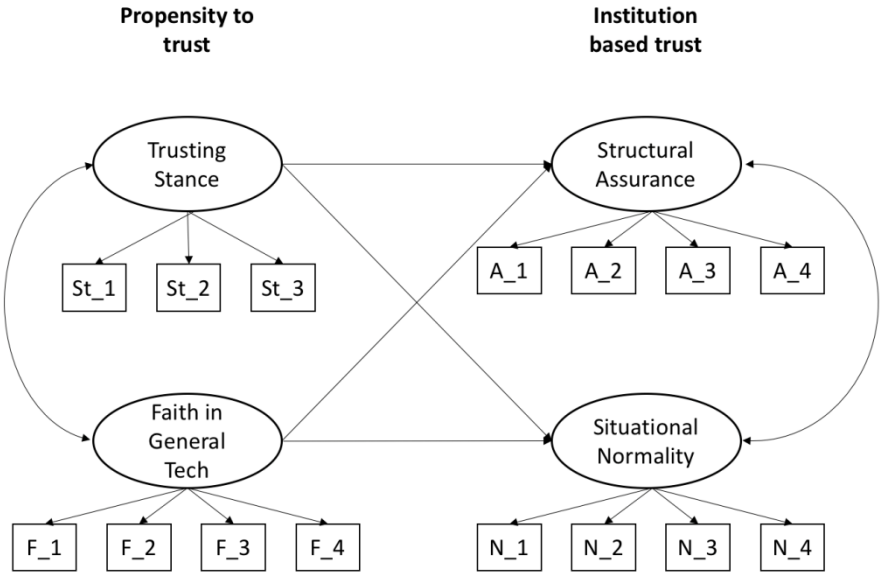

Figure 15. Measurement model of initial trust based on propensity to trust and institution-based trust.

For both models, reliability was measured for each of the scales. In order to determine which measure of reliability to implement, the scales were tested for essential tau equivalency: The essential tau equivalent model was tested against the congeneric model using a Chi-Square test. If the test indicated that the essential tau-equivalent model did not fit significantly worse, then the essential-tau-equivalent model could be assumed and Cronbach's Alpha was calculated as a measure of reliability (Graham, 2006; Peters, 2014). However, if the model did not fullfil the assumptions of tau-equivalence, then McDonald's Omega h was used as a measure of reliability (McDonald, 1985, 1999).

Step two – assessment of criterion validity. Finally, the criterion validity of the model was assessed by calculating the structural model. In another structural equation model, the measurement models of initial trust as well as knowledge-based trust were integrated: Based on the assumptions of McKnight and colleagues (2011), it was assumed that the two constructs representing propensity to trust (i.e. trusting stance and general faith) would predict the institution based trust (i.e. structural assurance and situational normality). This relationship is the same as is specified in the measurement model of initial trust. Beyond this relationship, it is assumed that both the variables representing propensity to trust, as well as the variables representing structural assurance would influence the trusting beliefs in a specific technology, as seen in figure 16.

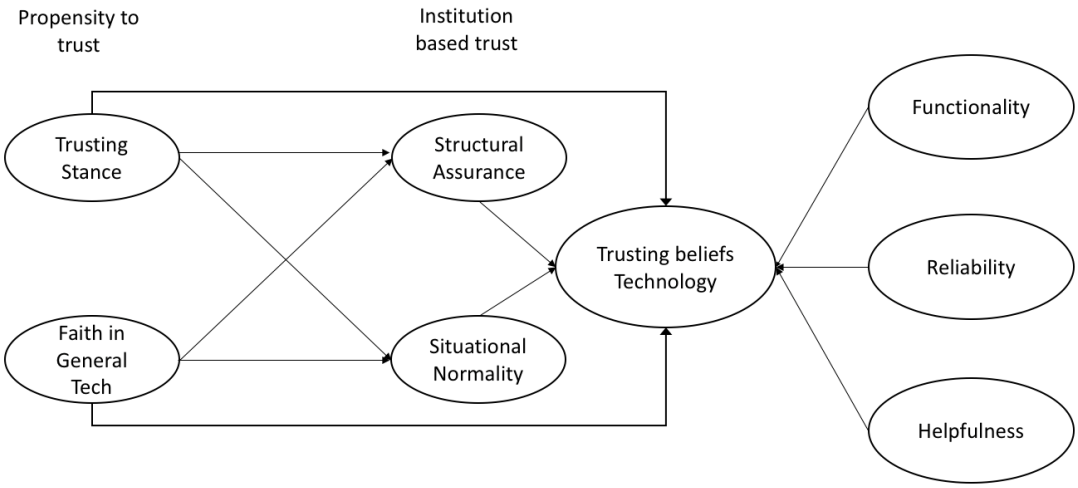

Figure 16. Structural model of initial trust and knowledge-based trust.

8.3. Results

Descriptive statistics. For the entire sample, the means for specific trusting beliefs for reliability were *M* = 4.24 (*SD* = 1.29), for functionality *M* = 4.57 (*SD* = 1.41), and for help-function *M* = 3.77 (*SD* = 1.23). As for the initial trusting scales, the mean for trusting stance was *M* = 4.29 (*SD* = 1.33), for faith in general technology *M* = 4.41 (*SD* = 1.01), for structural assurance *M* = 3.65 (*SD* = 1.15), and for situational normality *M* = 3.97 (*SD* = 1.31). The overall trusting belief for the entire sample was *M* = 4.16 (*SD* = 1.13). The means for each of the scales, as well as overall trusting beliefs for each of the three separate samples can be found in table8.

Table 8. *Means for each scale for the individual samples.*

scale	Sample 1	Sample 2	Sample 3
Reliability	4.03 (1.20)	4.40 (1.46)	5.42 (.91)
Functionality	4.40 (1.31)	4.27 (1.77)	5.90 (.88)
Help-Function	3.57(1.12)	4.28 (1.47)	4.58 (1.21)
Trusting Stance	4.24 (1.28)	4.24 (1.60)	4.65 (1.32)
Faith in general Technology	4.33 (.95)	4.31 (1.32)	4.95 (.94)
Structural Assurance	3.55 (1.08)	3.86(1.55)	4.10 (1.00)
Situational Normality	3.82 (1.21)	3.96 (1.59)	4.99 (1.23)
Trusting beliefs[1]	3.96 (1.01)	4.32 (1.47)	5.24 (0.72)

Note. Number in brackets are standard deviations; [1]Trusting beliefs are calculated as an overall sum score of the reliability, functionality and help-function scales; all items were answered on a 7-point Likert Scale ranging from 1 -strongly disagree to 7, strongly agree

Step one – Evaluation of the measurement models. Table 9 reveals the model fit of both the congeneric as well as the essentially tau equivalent models, the results of the Chi-square test comparing the model fit, and the reliability assessed either as Omega h, or Cronbach's Alpha, for each of the model scales.

Table 9. *Reliability of the subscales of the questionnaire*

		RCFI	*RRMSEA*	*SRMR*	χ^2(df), *p*	Reliability[3]
Functionality	Model1[1]	1.00	0.00	0.00	1.74 (2), .42	α = .87
	Model2[2]	1.00	0.00	0.02		
Reliability	Model1[1]	1.00	0.00	0.002	17.01 (5), < .01	ω_H= .68
	Model2[2]	0.99	0.06	0.07		
Help-function	Model1[1]	1.00	0.00	0.004	11.13 (5), < .01	ω_H = .74
	Model2[2]	0.99	0.05	0.05		
Structural Assurance	Model1[1]	0.99	0.11	0.02	4.15 (3) .25	α = .85
	Model2[2]	0.08	0.07	0.04		
Situational normality	Model1[1]	0.90	0.31	0.05	4.10 (3) .25	α = .86
	Model2[2]	0.90	0.20	0.06		
Trusting stance	Model1[1]	1.00	0.00	0.00	44.83 (2) < .01	ω_H = .85
	Model2[2]	0.91	0.25	0.16		
General Faith	Model1[1]	0.99	0.06	0.02	6.09 (3) .11	α = .80
	Model2[2]	0.99	0.06	0.04		

Note. [1]Model 1 is the congeneric measurement model; [2]Model 2 is the essential tau equivalent model; [3]Reliability either measured as Cronbach's α, when the essential tau equivalent model is non-inferior to the congeneric measurement model, or measured as McDonald's ω_H, if the essential tau equivalent model cannot be assumed.

The confirmatory factor analysis for the model of knowledge-based trust in a specific technology revealed good model fit: *RCFI* = .98, *RMSEA* = .053, SRMR = .041. Standardized factor loadings were $.67 \leq \lambda \leq .89$ (all $p < .001$; see Figure 17). The structural equation model of the initial trust model indicates a good to acceptable model fit: *RCFI* = .94, *RMSEA* = .076, SRMR = .049. Standardized loadings in the model were $.23 \leq \lambda \leq .90$ with all $p < .05$, except

for the regression of trusting stance to situational normality, with $\lambda = .18$ ($p = .06$, see Figure 18)

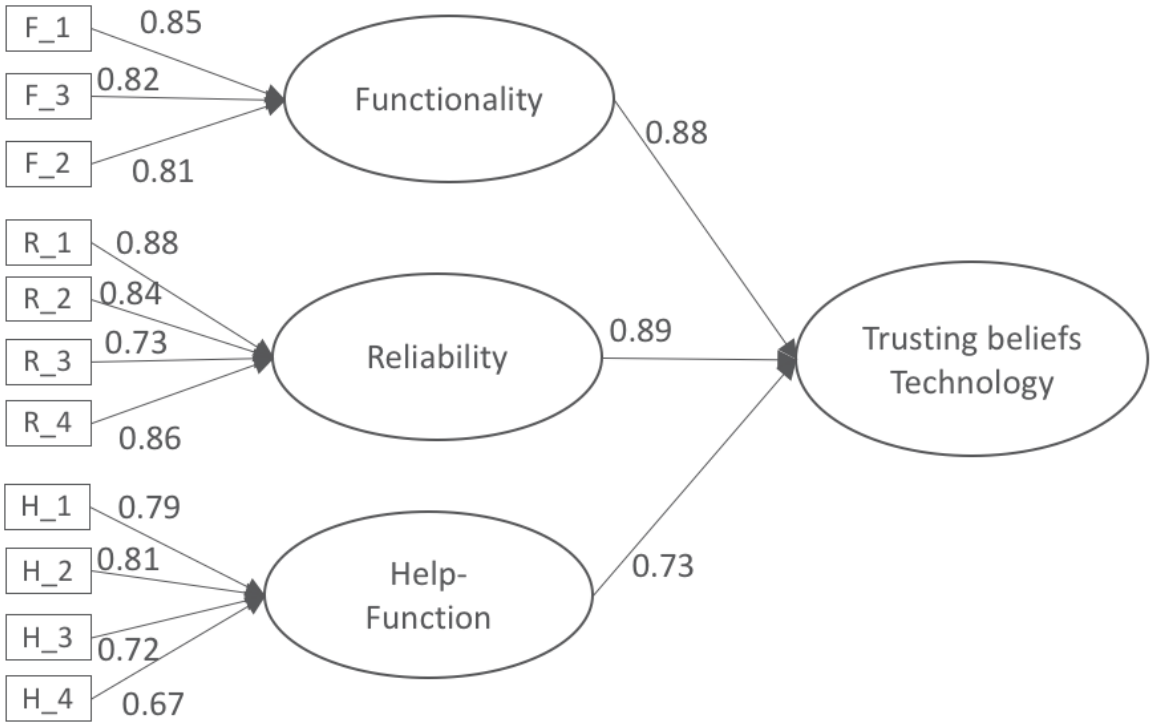

Figure 17. Results of the confirmatory factor analysis assessing knowledge-based trust

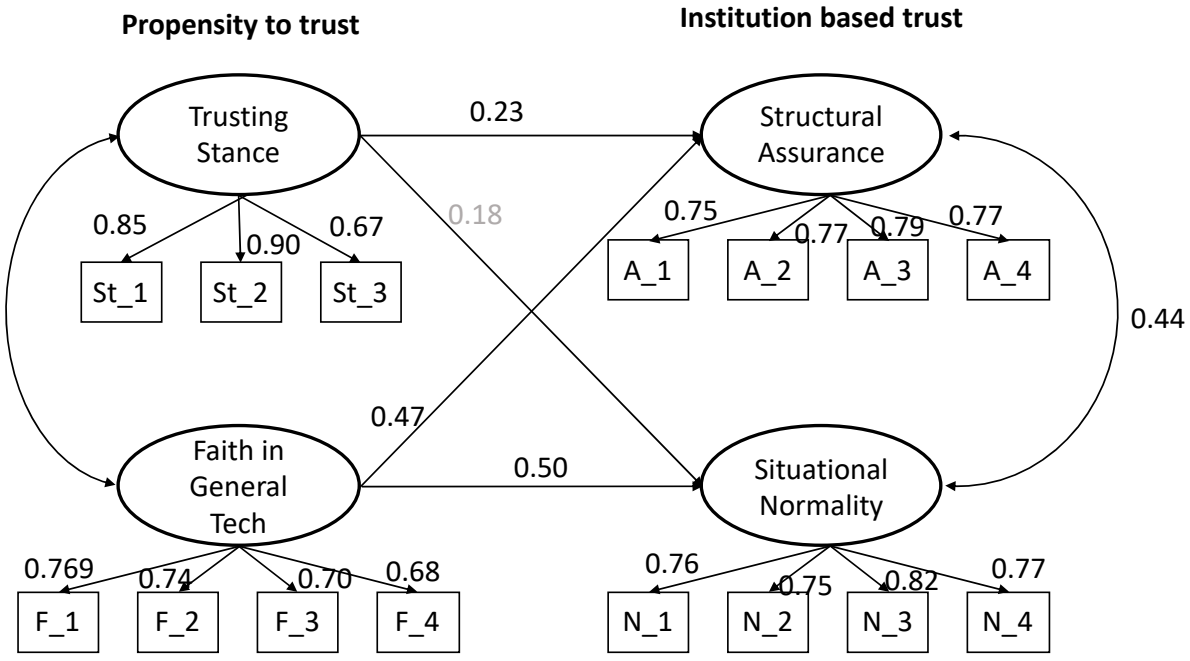

Figure 18. Results of the structural equation model assessing initial trust. All numbers indicate significant relationships, except for the light grey ones indicating the relationship between trusting stance and situational normality.

Step two – Assessment of criterion validity. Analysing the SEM, acceptable model fit was indicated: *RCFI* = .91, *RMSEA* = .071, SRMR = .15. Significant and positive standardized factor loadings were .25 ≤ λ ≤ .90 (all p < .05). One loading was not significant, i.e. the regression structural assurance to trusting beliefs (λ = 00, p = .94). The regression from trusting stance to trusting beliefs was significant, yet negative (λ = -.10, p < .05; see Figure 19).

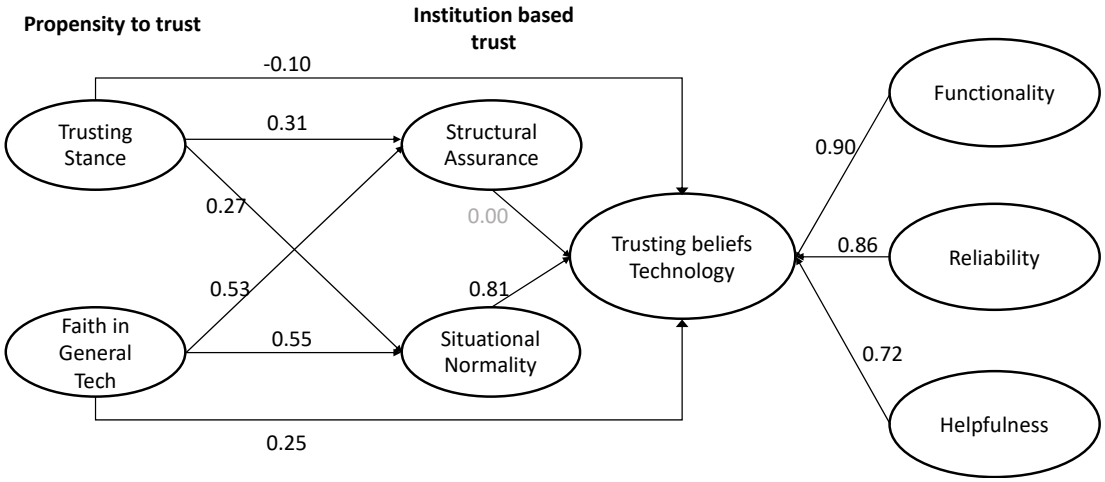

Figure 19. Results of the structural equation model assessing the criterion validity of the entire trust in technology model.
All numbers indicate significant relationships, except for the light grey ones, indicating the relationship between structural assurance and trusting beliefs.

8.4. Study Specific Discussion

Trust in technology has been shown to be important in explaining why people initially start as well as continue using a technology (e.g. Benbasat, Gefen, & Pavlou, 2010; Söllner, et al., 2016). The goal of this study was to develop a model of trust in technology, applicable to the context of sport and exercise technologies, as this might explain why people decide to use fitness and exercise applications or explain why athletes are compliant with technology use suggested by their coach. This study translated and adapted the English version of McKnight and colleagues' (2011) model of trusting beliefs in technology for the context of sport and exercise technologies.

Measurement model trusting beliefs. The measurement model of trusting beliefs in a specific technology is the part of the model which is specific to the exact technology one is using. It is conceptualized as knowledge-based trust, meaning that prior experience and exploration of the technology are important. The trusting beliefs are based on the perceived reliability, functionality and help-function of the specific technology. With regard to sport and exercise technologies, reliability describes the perception of how dependable for example

tracking software is, how well data export to an online platform is possible, or how smoothly training programs are run without glitches or errors. In other words, the scale assesses how reliable the application, platform or technology fulfills the functions it was designed to fulfill, enabling an athlete to train without limitations. The functionality describes the perception of whether or not an app or technology fulfills all the functions it was developed for. This depends largely on the expectation the user has of the technology, as training technologies offer a wide range of functions, depending on the target audience. Some applications merely offer a tracking of running time and distance, while more complex technologies give advice and recommendations. Depending on what the user expects from the technology, the scales assess whether the app has the functions necessary for their training. Finally, the help-function assesses whether the app or technology provides adequate support in case of errors or malfunctions when working with the technology.

In this sample, the proposed theoretical model showed excellent fit to the empirical data. Additionally, the reliability values achieved are indicative of a reliable measurement model. All loadings of the items to their factors are high. Thus, results provide support for the validity of the three-factor structure of knowledge-based trust in fitness and exercise technologies. With regard to practical implications, the results indicate that the scales of reliability, functionality and help function can be used to assess the perceived trustworthiness of a specific fitness and exercise technology.

Measurement model initial trust. The measurement model of initial trust is the part of the model which is more general. Institution based trust is adapted to the specific context of sport and exercise technologies, while propensity to trust are applicable to a general stance on new technologies. The beliefs of propensity to trust are based on a general stance towards new technologies, as well as a general faith and are not trustee or situation specific. Faith in general technology refers to beliefs about technology's general functionality, reliability and help-function, while trusting stance refers to the degree to which one believes in positive outcomes due to technology use. For these scale, not specific application to the sport or exercise context was necessary, as they describe the user's general attitude towards any new technology and are not specific to the context of sport and exercise technologies.

The measurement model by McKnight and colleagues (2011) specifies that the general propensity to trust should influence the institution-based trust, measured as structural assurance and situational normality. Situational normality is defined as the extent to which a technology user finds it normal to extend the use of the technology to other contexts and situations, while structural assurance is defined as the beliefs a user holds about the infrastructure supporting

technology use. With regard to sport and exercise technologies, the situational normality describes a user's perception of how normal it is to use exercise technologies. The scale assesses whether a user is comfortable with using exercise apps or platforms. Structural assurance, on the other hand, describes how an athlete perceives structural and legal assurances when using training technology, i.e. how does he or she perceive data security, consumer protection or user rights.

For this measurement model, the empirical data showed good fit to the proposed theoretical data. Additionally, the measures of internal consistency are good. Thus, the results provide support for the validity of the four-factor structure of initial trust in fitness and exercise technologies. With regard to practical implications, the results indicate that the four scales trusting stance, faith in general technology, structural assurance and situational normality can be used to assess initial trust in fitness and exercise technologies.

However, there are some limitations in this model that must be discussed. The regression of trusting stance to situational normality did not reach significance. This means that the general beliefs about technologies' usefulness did not predict the normality and ease of use of exercise and training technologies. In this sample, these constructs do not appear to be related. Additionally, the regression from trusting stance to structural assurance, while significant, is fairly low with a coefficient of .23. This makes the relevance of the factor trusting stance for the overall model debatable. It appears that general beliefs about technology are not necessarily relevant in predicting institution based trust in exercise and fitness technologies.

A possible explanation for this is the complexity of the items. The four items of this scale were more complex in their grammatical structure, than the items from other scales: Most items were formulated as simple statements, e.g. "The app is a very reliable piece of software". The items of the trusting stance scale, however, were more complex, with two parts to the statements, e.g. "I usually trust a technology until it gives me a reason not to trust it". It is therefore possible that these items were either misunderstood, or at least interpreted differently than the simple statement sentences. Another explanation might be the fairly high covariance of trusting stance and faith in general technology: The two constructs covariate at .78, indicating that the two constructs may not be distinct. It is possible that the additional value of trusting stance is fairly low, compared to the explanatory value of the factor faith in general technology.

Criterion validity. In order to assess the criterion validity of both measurement models, they were calculated together in a structural equation model. Per the original model specifications of McKnight and colleagues (2011) propensity to trust was to predict institution-based trust and both propensity to trust and institution-based trust were to predict the trusting

beliefs, measured as reliability, functionality and help-function. In this sample, the proposed theoretical model showed an acceptable fit to the empirical data. Due to the complexity of the model, however, the fact that an acceptable model fit was found is indicative of the stable model structure.

Despite the overall model fit, some limitations within the model need to be addressed. The regression from structural assurance to trusting beliefs was not significant, indicating no relationship between these constructs. The regression of situational normality to trusting beliefs, on the other hand, was.81 which is fairly high. This suggests that the impact of institution-based trust is better explained through the normality and ease of technology use, than through beliefs about data security and legal and structural backing.

Additionally, the regression of trusting stance towards trusting beliefs was negative, indicating that the higher the trusting stance, the lower the specific trusting beliefs. From a theoretical point of view, trusting stance describes a user's assumptions about technology's general functionality, reliability and help-functions, i.e. the extent to which they generally believe technology to be useful, function properly and provide adequate help. The specific trusting beliefs, on the other hand, describe a user's perception of the reliability, functionality and help-function of one specific technology, in this case, a specific exercise app. A possible explanation for this surprising and theoretically improbable relationship is, as discussed before, the complexity of the items of the trusting stance scale. Future studies, therefore, might look into rephrasing the items of the trusting stance scale, in order to achieve better results.

Another limitation of the study is the fact that the external validity has not yet been assessed: In the initial model by McKnight, trust in technology predicted technology use. This step was not yet replicated in this study, and should thus be done in future. Future studies might examine whether trust in sport and exercise technologies indeed predict continued use of those technologies. Taking it a step further, it would be interesting to see, whether trust in technology and continued app use have an influence on exercise behaviors, as apps and digital technologies would be an easy method to impact behavior change.

Despite these limitations, the model can be used to assess user's trusting beliefs about exercise technologies. The original model predicts, initial trusting beliefs can be used to assess why athletes initially choose to adopt the use of an app or platform, while the model of knowledge based trust can explain why athletes continue to use a technology after adoption and explore more functions. Future research can explore how apps can be designed to increase trust with this model. Furthermore, future research can examine how trust in apps can influence exercise behavior. If trust in training technologies predict the continued use of the technology,

it would be interesting to examine how the continued use of a technology influences actual behavior. This would offer a relatively easy intervention for behavior change. Another line for future research might be to examine various trusting relationships, by examining how trust in an actual coach, versus trust in a digital coach influence each other, or else to examine the relationship of interpersonal trust and trust in technology.

Conclusion

Overall, this study offers new insights into understanding trusting beliefs in sport and exercise technologies. The study was the first to adapt a model of general trust in technology to the sport context, making general trust constructs transferable to a specific area of application. The generally very complex model shows good fit in the current sample, indicating that the model structure is stable and theoretically solid. The concepts of general trusting stance, institution-based trust in app and training technology developers, as well as beliefs about the reliability, functionality and help-function of a specific training technology or app explain trusting beliefs in these technologies. Thus, this study provides a valid and reliable measurement instrument for trust in training and exercise technologies. Especially the measurement model for trusting beliefs in a specific technology showed excellent model fit. Thus, this model and measurement instrument offers a valuable contribution to future trust research, as well as future research on training and exercise technologies.

9. Study 3: Trust Transfer Effects within the Coach-Athlete Relationship – Trust in Technology and Trust in Coach

9.1. Specification of Hypothesis

Trust within online and digital environments is by far more complex than trust in traditional offline settings: As Söllner and colleagues (2016) observe, multiple trusting relationships must be considered within these online environments, i.e. trust not only in the communication partner, but also in the communication technology. Similarly, Beldad and colleagues (2010) have stated, that online trust must be considered alongside trust in the internet in general, the service provider, technology developer as well as the communication partner.

Because of this complex nature of trust, the current research proposed a model of trust within the coach-athlete relationship, while considering the role of (digital) technologies. Thus far, study one has addressed the mediator role of technology, examining how trust antecedents of coach are perceived by athletes depending on the context in which communication occurs. The study found that only the perception of benevolence was significantly impacted, while the perception of ability and integrity remained unaffected. Study two, on the other hand addressed technology directly in the trustee role, by validating a model and measurement method of trust in technology. This study confirmed the viability of the McKnight and colleagues (2011) model of trust in technology. The McKnight and colleagues (2011) model of trust in technology addresses some of the aspects previously mentioned by Beldad and colleagues (2010), in that the model incorporates institution-based trust into trust in technology. In a third step, this last study now addresses the question of interaction and transfer effects between different types of trust. This study, specifically, attempts to answer the question of whether or not trust transfer occurs from the technology to the coach, i.e. whether or not the trust in technology (or lack thereof) can affect the trust in coach.

Some online trust research has already looked at trust transfer effects: Stewart (2003) examined whether trust would transfer from one well known online store, to another, as well as whether institution-based trust would transfer from a physical, offline store, to an online store. The study was able to show that trust could be transferred from one well known store, to a lesser known online store, through a perceived interaction of the two stores, as well as a perceived similarity between the two stores. In the study, the interaction and similarity were indicated through hyperlinks on the website of the lesser known store. Similarly, other studies have examined trust transfer: Lee and colleagues (2011) were able to show positive trust transfer effects from an offline, to an online government service. In their study, Lee and colleagues found that the willingness to adopt e-government services was dependent on the quality of the

traditional, offline services. When the offline services were good, this transferred to the online context, and users were more likely to trust the online service and expect good outcomes. In another study, transfer was observed from an online context, to a mobile context: Wang, Shen, and Sun (2013) found that trust in a web service, as well as functional consistency lead to increased trust in a mobile service, as well as increased intention to use this device.

In summary, these studies have found that positive trust transfer can occur: when a lesser known online institution is associated with a trusted, well-known institution (either offline, or online), positive trust transfer occurs and the lesser known institution is trusted. The other direction, i.e. negative trust transfer, has yet to be examined. Furthermore, research examining trust transfer has examined transfer from one online store, to another, or else from offline to online stores, for e-government services, as well as from online to mobile services. However, research has not looked at trust transfer from online services, websites or technologies to a person, i.e. trust transfer occurring from trust in technology to interpersonal trust. Trust transfer has been found to occur from one "type" of trustee to the same type of trustee, i.e. from organizations to other organizations, or from online technologies functions to mobile technologies functions. Research has yet to look at the transference of trust, e.g. from one type of trustee to another type of trustee, e.g. from a store, or technology, to a person. However, due to the complex nature of trust within digital environments and the importance of considering multiple trusting relationships, it is necessary to look at other instances of trust transfer, i.e. transfer from a technology or the internet in general, to trust in a communication partner.

The current study aims at addressing this gap in the research and examines whether trust transfer occurs within the coach-athlete relationship. Specifically, the goal of this study is to assess whether a coach-implemented technology can have negative effects on trust in coach, due to low trust in technology. Thus, the study addresses the following questions:

> RQ 1) Does trust transfer occur from one "type" of trustee to another, i.e. from technology to person?

As such the current study will be the first to examine trust transfer between conceptually different trustees. The study will explore the transfer across trust models, and look at the relationship between interpersonal trust and trust in technology. Yet, this is not the only novice aspect of trust transfer the current study addresses. Besides the transfer form across different types of trustees, this study will also look at negative trust transfer. Research thus far has only shown positive transfer effects, i.e. examining the beneficial effect the association with a trusted

institution has. This study will address the question of negative trust transfer within the coach-athlete relationship:

RQ 2) Does a negative trust transfer occur from the technology to coach?

Mechanisms identified thus far for the occurrence of trust transfer are the similarity of two institutions, the interaction of the two, as well as functional consistency. Thus, for the current study it is assumed that for trust transference to occur from the technology to the coach, a close interaction and similarity of technology to coach will be important. In order to achieve this interaction and similarity, trust transfer will be examined in situations where the technology use is implemented through coach: It is assumed that trust transfer is most likely to occur when coach strongly recommends using a specific technology and vouches for it. In this case a similarity and correlation between technology and coach is most likely to be assumed.

Even though the interaction and similarity between coach and technology are produced, the problem still remains that coach and technology are two conceptually different trustees, with two conceptually different underlying trust models. However, it is still assumed that trust transfer can occur from one trustee to the other. The basis for this assumption lies within the similarity of the trust in technology, as well as interpersonal trust models implemented within this research, as well as the shared core of the constructs: Lankton and McKnight (2011) examined trust in Facebook, from an interpersonal, as well as from a trust in technology perspective, taking both trust in the people and trust in the technology into account. In their study, they hypothesized two different second order models: In the one model, trust in technology as well as interpersonal trust were two distinct second order factors. In this case, the factors reliability, functionality as well as helpfulness were hypothesized to be closer related with each other, than with the interpersonal "counterparts" of integrity, competence and benevolence. In their second model, Lankton and McKnight (2011) hypothesized three second order factors, which were integrity-reliability, competence-functionality, and benevolence-helpfulness. In this case, they hypothesized these factors to be more closely related with each other, and to be less distinct from the concepts of interpersonal and technology trust. The researchers assessed the perceived trust of 511 participants in a social networking site based upon interpersonal trust as well as trust in technology, testing both hypothesized models and finding a better fit for the model two. Thus, Lankton and McKnight (2011) conclude that the construct of technology trust and the constructs of interpersonal trust share a second order factor.

This theoretical similarity is used as the basis for assuming the existence of trust transfer from one conceptually different trustee to another. Because the constructs of integrity and reliability share a second order factor and are conceptually related, transfer can occur along those dimensions from one trustee to another. In order to examine this relationship more closely, a third research question will be addressed, looking at the specific antecedents necessary for trust transfer to occur. The study aims at assessing which of the McKnight and colleagues (2011) technology trust antecedents (i.e. functionality, reliability, help-function) have an influence on the trust in coach.

RQ 3) Which antecedents of technology trust have the most or least impact on interpersonal trust?

The goal of this study is to assess whether, for example, lacking reliability of the technology, leading to low trust in the technology, can also have detrimental effects of trust in coach. The reasoning for this is the assumption, that if coach is closely associated with the technology, and a similarity is perceived by the athletes, the lacking reliability and resulting problems in training are attributed not only to the technology, but also to the coach themselves. Through the conceptual similarity of reliability and integrity, the lacking reliability can also be attributed to a lack of integrity in coach and thus lead to less trust in coach.

Based on previous research, it is hypothesized that a trust transfer will occur, from the technology to coach. Overall, it is assumed that when the trustworthiness of the technology is low, the trustworthiness of coach will also be low. Within the context of this study, the trustworthiness of the technology will be determined through the functionality, reliability and help-function of the technology. Therefore, the specific hypothesis is as follows

H1: Negative trust transfer will occur: When the antecedents functionality, reliability or help-function of the technology are perceived as low, the overall trust in coach will also be low.

As no previous research has specifically examined trust transference from technology to people, nor have the specific antecedents been examined in the coach-athlete context, it is difficult to formulate a hypothesis about the specific and individual influence of the antecedents functionality, reliability and help-function, both globally on trust, as well as specifically on the interpersonal trust antecedents of ability, benevolence and integrity. However, based upon trust theories, a relationship between the antecedents will still be hypothesized: Both within the interpersonal trust model by Mayer and colleagues (1995), as well as within the trust in

technology model by McKnight and colleagues (2011), the specific impact of one of the trust antecedents over another is not described. Within both models, all three antecedents are perceived to be of equal importance for the overall assessment of trustworthiness. Therefore, it can be assumed that all three antecedents of trust in technology would also have an equal impact on the overall trustworthiness of coach and that it is not possible to discern an individual impact of the antecedents. However, one distinction will still be made: Based upon expert ratings (which will be discussed and explained in more detail in the methods section), the help-function appears to have the lowest relevance for athletes within this specific context. While it is paramount for a training technology or software to have necessary functions, as well as reliable programming, it is less important to the actual athletic training for the technology to have a help-function. Thus, it can be assumed that this dimension would have the least impact on the trustworthiness of coach: If the dimension is less relevant to the everyday training of an athlete, trust transfer would also be less likely to occur from this dimension. Additionally, the help-function dimension is correspondent to the dimension of benevolence within the Mayer and colleagues (1995) model. As previously discussed and seen in study one, the dimension of benevolence is less important and more difficult to discern and delineate from integrity early on in relationships. Therefore, it is plausible to assume that this dimension will also have less impact on the trust transfer, especially within early stages of a new relationship. Thus, a second hypothesis about the individual influence of the antecedents is formulated as follows:

H2: The antecedent help-function will have less impact on the perceived trustworthiness of coach than either the antecedent functionality, or the antecedent reliability.

In order to test these hypotheses, a vignette study is conducted, experimentally manipulating the functionality, reliability and help-function of training software within the context of a coach-athlete partnership, while assessing the perceived trustworthiness of coach. Participants in this study were presented a general situation description (providing background information about the coach-athlete relationship), information regarding the specific technology used including screenshots of the fictitious website, information regarding the athletic goal and training philosophy, as well as specific situation descriptions highlighting the functionality, reliability and help-function of the technology. After the presentation of the situation descriptions, participants were asked to rate the trustworthiness of their coach. The following chapters describe the exact methodology implemented in more detail.

9.2. Pilot Study – Development and Validation of Case Vignettes

In a first step, a pilot study was conducted, in order to validate the general situation description implemented within this study, as well as to validate the final vignettes used. The

goal was to ensure internal and external validity of the vignettes. In order to achieve this goal, a pool of experts was asked to assess both the general situation description, website description and screenshots, as well as an initial pool of vignettes. In the following, first the pool of experts will be described, after which the validation of the general situation description and the validation and selection of the final vignettes will be illustrated.

9.2.1. Describing the Pool of Experts

"Athletic experts". On the one hand, athletes were asked to assess the realism and relevance of the described situation and vignettes. The goal was to gain information about the external validity of the study material. Athletes included in the pool of experts had to have experience in regularly training and working with a coach, as well as working with a training software, app, wearable or training platform. Athletes from different endurance sports were incorporated into the pool, in order to assess the viability of the vignettes for different sports. In total, $N = 4$ athletes were asked to give an expert rating, two of which were endurance runners, training and competing for half marathon and marathon distances. One athlete was a track and field athlete, training for different running distances, and one athlete was a professional cyclist competing with a cycling team. Overall, the athletes had at least five years of individual experience in their respective sports. All experts also had both experience in working with a coach, as well as in using training technologies and software, both for their individual training, as well as for their communication with their coach. The athletic experts were asked to assess the general realism of the situation description, as well as the relatability and understandability of the description. Furthermore, they were asked to specifically rate how realistic both the website description and screenshots were. As for the individual vignettes, the athletic experts were asked to assess the understandability of the vignettes, as well as how relatable and relevant each vignette was.

"Scientific experts". On the other hand, researchers were asked to assess the internal validity of the vignettes, in order to determine how well each vignette matched the desired construct. Additionally, the scientific experts also assessed the general situation description and depiction of the website. Researchers included into the pool of experts had to be trust researchers with knowledge of the McKnight and colleagues (2011) model. Again, $N = 4$ experts were asked to provide a rating. Two of the experts hold PhDs in the fields of sport psychology and communication science, having performed trust research and worked with the model of trust in technology. The other two scientific experts were currently still working on their PhDs, also in the area of trust research (from the field of sport psychology and information science), working with the model of trust in technology. Therefore, the experts had in-depth

knowledge of the model, its constructs, and conceptually understanding the different trust antecedents. Thus, they were able to assess the internal validity of the vignettes. Each expert had to rate the general situation description on its understandability, as well as relatability and realism. As for the vignettes, the scientific experts were asked to assess the understandability and immersion of each vignette, while additionally determining how well each vignette matched each of the constructs functionality, reliability and help-function.

9.2.2. Validating the General Situation

In a first step, a general situation description[1] was developed, providing background information about the coach-athlete relationship. In addition to the background information on the relationship, information was also provided regarding the specific technology used, the athletic goal pursued by the athlete, as well as screenshots of the website used.

The situation was described in a way suggesting an existing coach-athlete relationship based on one year of working together. Coach was described as competent, helping the athlete to achieve their athletic goal in the prior season. For the new season, the goal was to achieve a new best-time in a competition. The exact sport was not revealed in the vignette, so that athletes of different sports could easily immerse themselves into the situation. The sport was kept vague, so that runners, cyclists, triathletes all could see themselves in the case description. However, there was a general emphasize on endurance sports and for some of the specific vignette descriptions, running was explicitly referenced. It was expected, however, that any endurance athlete, including cyclists and triathletes would conduct at least some running sessions. The goal of the new season was kept vague as well (self-improvement, rather than a specific time, or placement in a competition), so that athletes of different levels could all relate to the situation.

Coach gender was matched to participant gender in the description, i.e. male athletes were presented a male coach, while female athletes were presented a female coach. This was done to avoid gender effects within the coach athlete relationship. Studies show that both male and female athletes perceive a male or female coach differently and that same sex dyads interact differently than mixed sex dyads (e.g. Jowett & Clark-Carter, 2006; Jowett & Cockerill, 2002; Jowett & Nezlek, 2011; Tomlinson & Yorganci, 1997). To avoid these possible confounding effects, all athletes received a gender-matched coach.

The general situation description went on to describe that coach implemented a new technology for the new season, highlighting that coach insisted on working with this specific

[1] The entire description of the general situation can be found in the appendix of this work in German language.

technology and is convinced it is a good technology. This was added into the general situation description, to highlight the connection and similarity of the technology to coach. The general functions of the technology as well as screen shots of the website were included into the situation description (see figure 20). The implementation of this technology was described as a new feature to the coach-athlete relationship within this new season.

The situation description also included information about the general training philosophy of the coach, i.e. that coach adjusted the training intensity based on the athletes' heart-rate. Additionally, it was described that coach put the main emphasis of training on interval and speed training sessions, in order to improve upon the personal best-time. This information was included on the one hand to provide more information about coach's ability. On the other hand, this information was included to increase the relevance of the different functionalities of the technology (e.g. the heart-rate tracking, or pace tracking of the training technology).

The coach-athlete interactions were also described: Coach and athlete were described as having interacted mostly through e-mail in the previous season, and now using the new technology and training platform in the new season. In addition to the digital interaction between coach and athlete, personal face to face meetings were described as happening once every three months. However, due to feedback from the experts, the number of face to face meetings was increased to once a month, as the experts stated that once every three months was unrealistic.

The general situation description, as well as the screen-shots of the fake online platform were tested in the pilot measure. All experts were asked to rate the description on realism, relatability and understandability, as well as specifically rate the website on realism on a six-point Likert Scale ranging from -3 to +3 on all dimensions. Overall, good scores were achieved: All experts rated the general situation description as realistic (M = 2.0, SD = 0.82), understandable (M = 2.75, SD = 0.47) and immersive (M = 2.0, SD = 0.93). The website itself was also rated as realistic (M = 2.28, SD = 0.52).

In accordance with the feedback slight adaptations to the vignette were made: The number of coach-athlete face to face contacts were increased and the amount of background information on coach was increased as well. Furthermore, slight changes were made to the website, incorporating additional features of the platform as described by the athletic experts. The screenshots in figure 20 already show the final version, as presented in the actual study

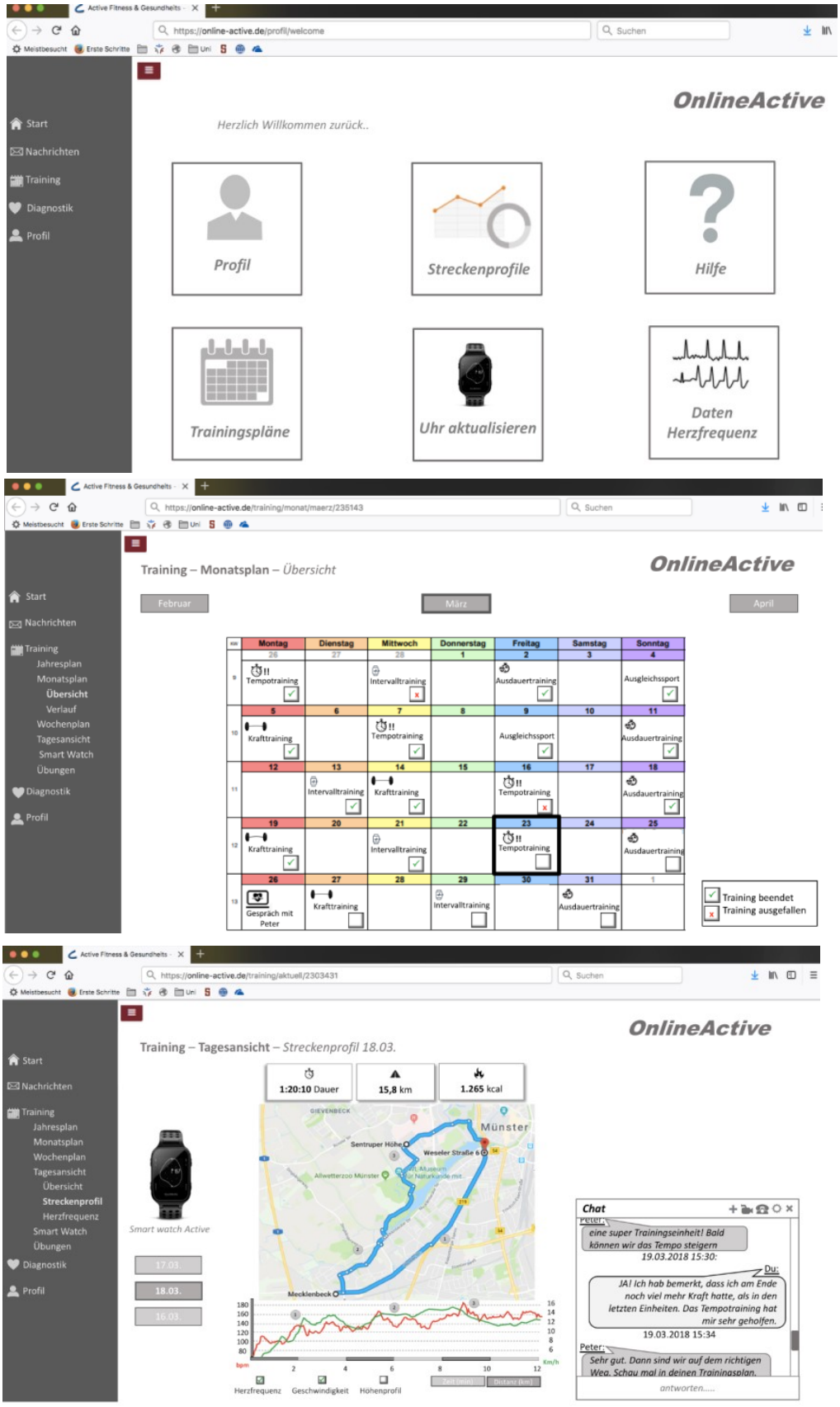

Figure 20. Screenshots of pages of the training technology implemented within the study, as presented to the participants.

9.2.3. Validating and Identifying the Final Vignettes

Apart from the general situation description, individual vignettes were developed for each of the relevant trust in technology antecedents. Initially, a pool of 15 vignettes, fives vignettes per technology trust construct (i.e. functionality, reliability, help-function) were created, based upon in depth knowledge of the theoretical constructs. Each of the vignettes was constructed in a way to distinctly address and describe only one of the three constructs. Furthermore, for each vignette a high and low condition was formulated, i.e. either describing the respective construct very well, or very poorly. Both the positive and negative vignette were formulated in a way to make them as similar as possible in length and wording, so that differences between the vignettes could be attributed to differences in content, not to differences in semantics or attentional capacity.

This initial pool of items was given to both the scientific and athletic experts. All experts were asked to rate the vignettes on a six-point Likert scale (ranging from -3 to +3) on the following scales: Understandability of the vignette, as well as how immersive the vignette was. Additionally, the athletic experts rated the vignettes on how relevant this described construct was for their training, while the scientific experts rated how well each vignette addressed each of the three trust antecedents. Besides the Likert rating, all experts had the option of giving open feedback, with regard to wording and content of the vignettes.

The results of this first pilot measurement were then assessed and evaluated. The goal was to identify those vignettes with the highest relevance for athletes, while at the same time showing good distinction between the three constructs of trustworthiness of technology. The variables of understandability and ease of immersion were used as controls, to ensure that the vignettes had no shortcomings on those factors. For each construct the two best vignettes out of the original five were selected and can be found in table 10. The best two vignettes per construct were identified based on their scoring on relevance, as well as on how well they discriminated between the three constructs. A vignette scoring high on relevance was still excluded if it, for example, scored high both on functionality and help-function. Additionally to the objective ratings from the experts, their open comments were considered as well: Some vignettes were excluded due to complex wording or unclear statements.

Table 10. *Overview over the top 2 vignettes out of the initial 15 vignettes as determined by the expert rating.*

No	Vignette	Under-stand (N=8)	Imme-rse (N=8)	Rele-vance (N=4[1])	Func (N=4[2])	Rel (N=4[2])	Help (N=4[2])
Func1 *	+ During training you notice your GPS watch has the function to differentiate running times from standing times at traffic lights, so that you can automatically subtract break-times from your running time - During training you notice your GPS watch does not have the function to differentiate running times from standing times at traffic lights), so that you cannot subtract break-times from your running time	2.63 (0.18)	2.94 (0.06)	2.5 (0.29)	2.75 (0.25)	0.25 (1.60)	-1.25 (1.43)
Func2	+ The watch has a wireless-lan function, with which the data can be uploaded into the trainings platform. Therefore, you only need to press one button “update”, and all your trainings data will be saved up to date - The watch does not have a wireless-lan function. In order to upload the data into the trainings-platform, the watch must first be connected to the computer via a cable, before you can save your trainings data up to date	2.1 (0.53)	2.81 (0.13)	1.88 (0.52)	3 (0)	-2.25 (0.48)	-1.25 (1.11)
Rel1	+ While running you notice the GPS of your watch works reliably and exact, and your running times and distances are measured correctly. - While running you notice the GPS of your watch does not work reliably or exact, and your running times and distances are measured with several 100m inconsistencies.	3 (0)	3 (0)	3 (0)	0.75 (0.95)	2.75 (0.25)	-2.25 (0.5)
Rel2 *	+ While training you notice your heart-rate is measured exactly and reliably, and you can use this to control your training intensity. - While training you notice the heart-rate is not measured exactly or reliably, and you cannot use it to control your training intensity.	2,29	1,87	2,25	0	1.25	-0.88
Help1	+ When you had a problem with one of the functions of your watch, you found a solution for your problem in the help-function of the software without having to look for long. - When you had a problem with one of the function of your watch, you did not find a solution in the help-function of the software, but had to look for a solution online, which took you a long time.	2.31 (0.21)	2.13 (0.52)	0.88 (0.52)	0.75 (1.31)	-2.75 (0.25)	2.75 (0.25)
Help2	+ When you are working with the training software for the first time, the help-function offers you a good introduction and tutorial, so you quickly understand how the data export, import and comment functions work. - When you are working with the training software for the first time, you miss a help-function or tutorial, and you struggle to understand how the data export, import and comment functions work	2.63 (0.75)	2.28 (0.75)	2.0 (0.81)	0 (2.58)	-1.75 (1.89)	3 (0)

Notes: Func = Functionality construct, Rel = Reliability construct, Help = Help-Function construct; [1] N = 4 refers to the four athletic experts, the relevance of the different vignettes for training was assessed only by the athletes who have experience with training technologies and can thus assess the relevance better; [2] N = 4 refers to the four scientific experts, who have in-depth knowledge and understanding of the McKnight and colleagues (2011) trust in technology model and can thus assess the internal validity of the vignettes and how well they describe the different constructs of the model

* Vignettes marked with an asterisk are the ones that were later changed according to the comments and used in the final vignette pool; Numbers are mean assessed on a scale from -3 to +3, numbers in brackets are standard error of the mean

The expert ratings revealed that especially the functionality scale was difficult to distinguish from the other two scales: many vignettes were either rated high for functionality and reliability, or else for functionality and help-function. Interestingly, the expert ratings showed that especially the help-function vignettes were rated low in relevance to the athlete compared to the other two constructs.

Each of the final six vignettes was then reviewed in more detail and changes in wording, suggested by the experts, were incorporated. These were then compared with each other and the final vignette selection considered the relationship of the vignettes between each other. For the functionality construct, the vignette Func1 (from table 10) was chosen, even though Func2 showed a better distinction between functionality and help-function. However, Func1 showed a higher relevance, which was rated as more important. Furthermore, a few changes in wording were incorporated into the vignette, as recommended by the experts. As for the reliability construct, Rel2 was chosen, even though Rel1 showed better scores overall. However, Rel1 and Func1 both refer to the same function of the technology, i.e. the GPS functions. It was important that the vignettes did not contradict each other, therefore Rel1 could not be used. Instead, the exact wording of Rel2 was adapted according to the expert feedback. The final wording of Rel2 was therefore much closer to Rel1, except it did not refer to the GPS function, but rather to the heart-rate tracking function. As for the help-function vignette, Help1 was chosen over Help2, despite Help2 showing the better values. This was done, as the general relevance of the help-function dimension was put into question by the experts, due to the existence of online searches and online help-discussion boards. The Help1 variable incorporates this aspect, by contrasting the help-function with an online search. Thus, Help1 was chosen, in order to assess whether a help-function was important and beneficial towards trust, when compared to an online search. Again, the wording was adapted where appropriate. The final vignettes can be found in table 11 , along with the German original version.

Table 11. *German original and English translation of the final vignette pool.*

German	English
	Functionality
+ Du merkst im Training, dass die GPS Uhr die Funktion hat, Stehzeiten von Laufzeiten zu differenzieren, sodass Stehpausen (z.B. an Ampeln) automatisch aus deiner Laufzeit herausgerechnet werden können.	+ During training you notice your GPS watch has the function to differentiate running times from standing times (e.g. at traffic lights), so that you can automatically subtract break-times from your running time
- Du merkst im Training, dass die GPS Uhr keine Funktion hat, um Stehzeiten von Laufzeiten zu differenzieren, sodass Stehpausen (z.B. an Ampeln) nicht aus deiner Laufzeit herausgerechnet werden können.	- During training you notice your GPS watch does not have the function to differentiate running times from standing times, so that standing times (e.g. at traffic lights), so that you cannot subtract break-times from your running time
	Reliability
+ Du stellst im Trainingsalltag fest, dass der Pulsmesser deiner GPS Uhr genau und zuverlässig funktioniert und dein Puls immer korrekt und ohne Aussetzer erfasst wird.	+ While training you notice the heart-rate monitor of your GPS watch works reliably and exact, measuring your heart-rate correctly and without errors
- Du stellst im Trainingsalltag fest, dass der Pulsmesser deiner GPS Uhr ungenau und unzuverlässig funktioniert und dein Puls minutenweise auf über 250 hoch springt oder zum Teil gar nicht erfasst wird.	- While training you notice the heart-rate monitor of your GPS watch works unreliably and inaccurately, measuring your heart-rate as over 250 for minutes, or else not measuring anything at all.
	Help-Function
+ Als du mit einer Funktion der Uhr nicht klargekommen bist, hast du in der Hilfefunktion deiner Software ohne langes Suchen eine Lösung für dein Problem gefunden.	+ When you had a problem with one of the functions of your watch, you found a solution for your problem in the help-function of the software without having to look for long.
- Als du mit einer Funktion der Uhr nicht klargekommen bist, hast du in der Hilfefunktion deiner Software keine Lösung gefunden und musstest Online nach einer Lösung suchen, bis du eine Lösung alleine gefunden hast.	- When you had a problem with one of the function of your watch, you did not find a solution in the help-function of the software, but had to look for a solution online, which took you a long time.

9.3. Methods Main Study

9.3.1. Sample

Once the final vignette pool was identified, the main study was conducted. A power analysis was run with G*Power 3.1 prior to data collection, for the main analysis. As no previous research exists, a small to medium effect size of $f^2 = 0.08$ and a power of $1- \beta = 0.8$ were chosen for the repeated measures ANOVA with a between-within interaction, revealing an optimal sample size of $N = 154$ participants. The vignette study was conducted as an online questionnaire using the Unipark online survey (https://www.unipark.com/) and the link to the questionnaire was spread through Facebook groups (student groups, as well as various running, cycling, and fitness groups), direct recruitment, mailing lists and in sports- and exercise classes, as well as in psychology classes. The online questionnaire was active form May 2018 until mid-July, 2018.

Overall, $N = 165$ participants completed the online questionnaire, with over 3100 participants accessing the link. Of all participants accessing the link to the study, only 5.23% completed the entire study, with 90.20% not proceeding beyond the first page. Of the 165 participants, 4 participants withdrew their consent, leaving the final sample at $N = 161$ (65.2% female). On average, participants were $M_{age} = 25.91$ years old ($SD_{age} = 8.12$) and reported being active $M_{times} = 3.08$ ($SD = 1.80$) times per week with on average $M_{years} = 8.69$ ($SD = 7.73$) years of experience in various sports. Of all participants, 40.4% indicated to be currently working with a coach, while 73.9% reported having worked with a coach before. Furthermore, 46.0% of the sample indicated having experience in working with a sport or exercise application or technology. The general trust in technology of participants was assessed via the German version of the McKnight and colleagues (2011) items (validated in study 2), revealing that participants indicated high general trust in technology $M_{trust} = 4.02$ ($SD_{trust} = 0.80$) on a five-point Likert scale.

9.3.2. Measurement Instruments

Trust in coach. In order to measure the trust in coach, a short form of the interpersonal trust scale by Mayer and Davis (1999) was used, measuring trust with only nine items on a five-point Likert scale ranging from 1 (strongly disagree) to 5 (strongly agree). Three items of the questionnaire address the ability construct, three items address the benevolence scale and three items address the integrity construct (the entire questionnaire can be found in the appendix of this work). The scales were reduced by assessing item selectivity, factor loadings and fit (Dreiskämper, Pöppel, Petróczi, Folkerts, & Strauss, in prep). This shorter version was used to be more economical, as participants had to answer the items multiple times. The questionnaire

allows a valid assessment of each of the three trustworthiness constructs, as well as the calculation of a global trustworthiness score. In its initial development and validation, the questionnaire showed good scores (Dreiskämper, et al., in prep). As assessed with the current sample, the global scale of trustworthiness revealed good reliability, with a Cronbach's $\alpha = .88$, while the subscales also revealed good to acceptable scores for ability ($\alpha = .75$), benevolence ($\alpha = .81$) and integrity ($\alpha = .63$).

Trust in technology. In order to assess a general propensity to trust technology, the previously validated (study 2) scale of McKnight and colleagues (2011) was used. With this sample, the scale showed good reliability, as measured by Cronbach's alpha ($\alpha = .84$). As for specific trusting beliefs regarding the technology, one item each per construct (i.e. functionality, reliability and help-function) was used as a manipulation check: As the three constructs were systematically manipulated between the vignettes, the constructs were also assessed per vignette in order to test whether or not the manipulation worked. As this was merely a manipulation check, and the goal was not to measure trust in the technology, only one item per construct was used in order to ensure a conservative measurement. In order to assess functionality, the item "The training-technology (watch and platform) have the functions I need for my training" (English original item the German item was based on) was used. For reliability the item "This training technology (watch and platform) appears to be very dependable software" was used while the item "the training technology (watch and platform) offer me competent guidance through a help-function (as needed)" was used for the help-function construct.

Additional measurement. Besides the trust measurements, demographic information on age, gender, exercise behavior, app-experience and coach-athlete relationship was assessed. Additionally, the sport-orientation questionnaire (Elbe, 2004) was measured. This questionnaire assesses the general orientation and sport motivation an athlete has. The questionnaire collects information on three scales about an athlete's competition orientation, goal orientation, or win orientation, determining which aspects of athletic achievement are most important to an athlete. A general goal orientation indicates that athletes are most motivated by pursuing a personal goal. A strong win-orientation indicates that athletes are motivated by being better than others , while the third, the competition orientation, indicates athletes are motivated by a competitive setting. This questionnaire was included in the data collection, in order to control how well the participants were able to emphasize with the general vignette, i.e. whether they can generally emphasize with the goal-orientation described in the vignette. The three

scales of competition orientation (α = .94), goal orientation (α = .85) and win orientation (α = .88) all achieved good reliability scores as assessed via Cronbach's Alpha in this sample.

9.3.3. Procedure

The study was conducted as a between-within vignette design, i.e. each participant assessed coach's trustworthiness at three time points: t_1 assessed trustworthiness as a baseline measure, after the general situation description and before the introduction of a technology. At t_2 trustworthiness was assessed after the introduction of the technology, yet while describing the technology to be fully functional, reliable and with a well working help-function. All participants were given the same baseline and t_2 anchor information. At t_3, however, each participant was presented with one of seven different vignettes, accounting for the between factor of the design. Each vignette included information on all three trust in technology antecedents. As the study includes three independent variables (i.e. functionality, reliability and help-function) each being present in a high or low condition, this results in a 2x2x2 pool of possible vignettes (see figure 21). The 1-1-1 condition was implemented as an anchor condition at t_2, giving all participants an initial identical reference value to calculate possible detrimental effects from. The other seven conditions all were parallel experimental conditions.

	$B = b_0$	$B = b_1$	$B = b_0$	$B = b_1$
$A = a_0$	$a_0b_0c_0$	$a_0b_1c_0$	$a_0b_0c_1$	$a_0b_1c_1$
$A = a_1$	$a_1b_0c_0$	$a_1b_1c_0$	$a_1b_0c_1$	$a_1b_1c_1$
	$C = c_0$		$C = c_1$	

Figure 21. Vignette combinations.
A represents the functionality construct, B represents the reliability construct, and C represents the help function, each in a high (1) or low (0) condition. The $a_1b_1c_1$ condition represents the t_2 anchor condition.

Participants were first given general information about the study and its research goal. The exact goal of the study was not revealed, as to not prime participants towards the topics of technology or trust in coach. Then, participants were required to provide demographic information, as well as fill out the sport orientation questionnaire. Next, participants were split into different groups depending on gender, providing male participants with the general situation description describing a male coach, while female participants read a description of the female coach. Participants had time to examine the screenshots of the training software, before they were asked to give an initial base-line indication of trust in coach (t_1).

Following the baseline measurement, all participants saw the same vignette, describing the technology as highly functional, reliable and with a good help-function (1-1-1-vignette). Again, participants were asked to indicate their trust in coach, as well as an assessment of functionality, reliability and help-function (t_2)

Finally, participants were quasi-randomly assigned one of the seven parallel vignette conditions. The mechanism for randomization was to assign each next participant into the condition with the least participants. If all conditions had the same number of participants, a group was chosen at random. If several conditions had the same low number of participants, again a group was chosen at random. This mechanism assured that there was a nearly equal number of participants in each condition, while at the same time randomly assigning participants into the groups. The distribution of participants per condition is depicted in table 12. After presentation of the specific vignette, participants were again asked to indicate their perception of trustworthiness, as well as their perception of functionality, reliability and help-function (t_3).

Table 12. *Distribution of participants among the seven parallel conditions.*

	Participants[1]	Age[2]
Group 1 0-0-0[3]	24 (16)	22.96 (2.88)
Group 2 0-0-1[3]	22 (14)	28.14 (10.15)
Group 3 0-1-0[3]	23 (15)	24.22 (5.38)
Group 4 1-0-0[3]	24 (16)	25.5 (8.45)
Group 5 0-1-1[3]	22 (14)	27.64 (7.86)
Group 6 1-0-1[3]	23 (15)	25.04 (8.93)
Group 7 1-1-0[3]	23 (15)	28.17 (10.27)

Notes. [1]Numbers in brackets indicate number of female participants per group; [2]Numbers in brackets are standard deviation; [3] 0 and 1 indicate whether construct was fulfilled high or low, the first digit represents the functionality, the second the reliability and the third the help-function antecedents

9.3.4. Statistical Analysis.

Descriptive statistics and manipulation check. The global trust score was calculated for each participant by averaging the nine trust items, for the t_1, t_2, and t_3 measurements. Furthermore, the score for general propensity to trust technology was calculated, as well as the sport orientation scores for goal orientation, win orientation and competition orientation. The mean trust scored at baseline, t_2 and t_3 were tested for normal distribution using the Kolmogrov-Smirnov Test of normality.

A manipulation-check was performed, in order to determine whether the vignette manipulation was successful or not. In order to do this, three separate two factorial between-within ANOVAS were run, one for each of the three factors functionality, reliability, and help-function. The within-factor was the repeated measurement at t_2, and t_3, while the between factor consisted of the seven parallel vignette conditions. Where necessary, Greenhouse Geisser corrections were used.

Main analysis and post-hoc testing. In order to test the main hypothesis of this study, a repeated measures between-within factorial ANOVA was calculated. The within-factor was the repeated measurement (t_1, t_2, and t_3), while the between factor consisted of the seven parallel vignette conditions. Age was entered into the ANOVA as a covariate, to account for possible age effects in technology use. Where necessary, Greenhouse Geisser corrections were used.

In order to conduct post-hoc analysis and determine which trust in technology antecedent had the lowest and highest effect on the perception of trustworthiness, the difference of trust at t_3 and t_2 was calculated: by subtracting the trust at t_3 from the trust at t_2, a score was calculated indicating by how much the perception of trustworthiness decreased. This score was then entered into a univariate ANOVA, with the seven parallel vignette conditions as the between factor. In order to determine the individual impact of the conditions, a repeated contrast-testing was performed. Based on the hypothesis that the factor help-function would have the least impact, while both functionality and reliability would have the same impact, the seven conditions were ordered in a logical, hierarchical order, before being entered into the ANOVA. The following order was determined:

$$0\text{-}0\text{-}0 < 0\text{-}0\text{-}1 < 0\text{-}1\text{-}0 = 1\text{-}0\text{-}0 < 0\text{-}1\text{-}1 = 1\text{-}0\text{-}1 < 1\text{-}1\text{-}0$$

Within this equation, the first number of each triplet stands for the functionality dimension, the second for the reliability dimension, and the third for the dimension of the help-function. The zero and one in the number triplets indicate whether the condition was fulfilled well (1), or poorly (0) in the vignette. Thus, the lowest perception of trustworthiness was

expected for the 0-0-0 condition, wherein the technology is described as not being functional, reliable, and not having a help-function. The least detrimental effect on trust in coach, however, was expected for the 1-1-0 condition, wherein merely the help-function was described as poor, while the technology was still described as being functional and reliable. This order was entered into the ANOVA for contrast testing, using a repeated contrast method.

Follow-up analysis and co-variates. In further follow-up analyses, the influence of each of the trust in technology antecedents on their corresponding interpersonal trust antecedent was examined: This was done by calculating the difference of perceived ability, benevolence and integrity from the t_2 anchor condition to the t_3 vignette condition, to determine by how much each of those antecedents were reduced. Those differences were then entered into a multivariate ANOVA, with post-hoc contrast-testing, to determine whether they were impacted individually by the trust in technology antecedents.

In a final step, the variables of general trust in technology as well as age were considered as possible covariates. It was assumed that participants with a lower trust in technology might therefore judge coach more harshly. This case, the trustworthiness of coach would suffer even bigger detrimental effects. Additionally, age was considered as a covariate, as age generally correlates with technology-affinity. It was assumed that younger participants, who are thus "digital natives" might judge coach differently due to poor technology, than older participants. In order to determine the relevance of these factors, a bivariate Pearson correlation of the general trust in technology score with the trust difference (t_2-t_3), as well as of age and the trust difference were calculated. Furthermore, a univariate ANOVA was run, for the mean trust in technology score, and the seven parallel vignette conditions as the between factor in order to assess whether trust in technology differed among the groups. Similarly, a univariate ANOVA was run, for age and the seven parallel vignette conditions as the between factor in order to assess whether age differed significantly among the groups.

9.4. Results

Descriptive statistics and manipulation check. Descriptive values (i.e. means and standard deviation) for coach's perceived trustworthiness at t_1, t_2, and t_3, perceived functionality, reliability and help-function at t_2, and t_3, as well as general propensity to trust technology can be found in table 13. The Kolomogorov Smirnov Test revealed normal distribution for the variables trust measured t_2 ($D(161) = 0.068$, $p = .20$), while the test indicates a non-normal distribution for trust measured at baseline ($D(161) = 0.074$, $p = .03$) and trust at t_3 ($D(161) = 0.091$, $p = .00$).

Table 13. *Mean scores and standard deviations of the perceived trustworthiness, technology antecedents and general propensity to trust across all experimental conditions.*

	Measurement t_1	Measurement t_2	Measurement t_3	General measurement
Perceived trustworthiness	3.77 (0.56)	3.70 (0.63)	3,36 (0.70)	/
Perceived functionality	/	4.26 (0.83)	2.75 (1.16)	/
Perceived reliability	/	4.25 (0.87)	2.53 (1.20)	/
Perceived help-function	/	4.30 (0.81)	2.52 (1.39)	/
General propensity to trust	/	/	/	4.02 (0.80)

Notes. t_1 is the baseline measurement, after presentation only of the general situation description, mean based off of $N = 161$; t_2 is the anchor measurement, after presentation of a vignette with high technology functionality, reliability and good help-function, mean based off of $N = 161$; t_3 is the measurement after presentation of individual vignette, mean based off of $N = 161$, averaged across the different vignette conditions. Numbers in brackets indicates the standard deviation. All constructs were measured on a five-point Likert scale

Nonetheless, the ANOVA was still calculated, as it is robust against non-normal data for samples with N > 30 participants, as was the case (Wilcox, 2012). For the manipulation check, the repeated measures between-within ANOVA for functionality ($F(1,154) = 194.62$, $p < .05$, $\eta^2 = 0.56$), reliability ($F(1.,154) = 274.07$, $p < .05$, $\eta^2 = 0.64$) and help-function ($F(1,154) = 236.49$, $p < .05$, $\eta^2 = 0.61$) revealed a significant main effect of the repeated measures factor. As Figure 22 shows, the manipulation was successful for the reliability and help-function factor, and mostly successful for the functionality factor, with some difficulties within some vignettes. The figure indicates the change of perceived functionality, reliability and help-function from one vignette condition to the next. In conditions in which the factor (either functionality, reliability or help-function) was low (0), the resulting perceived factor is expected to be lower than in conditions wherein the factor was high (1). The figure shows the actual fluctuations between the conditions.

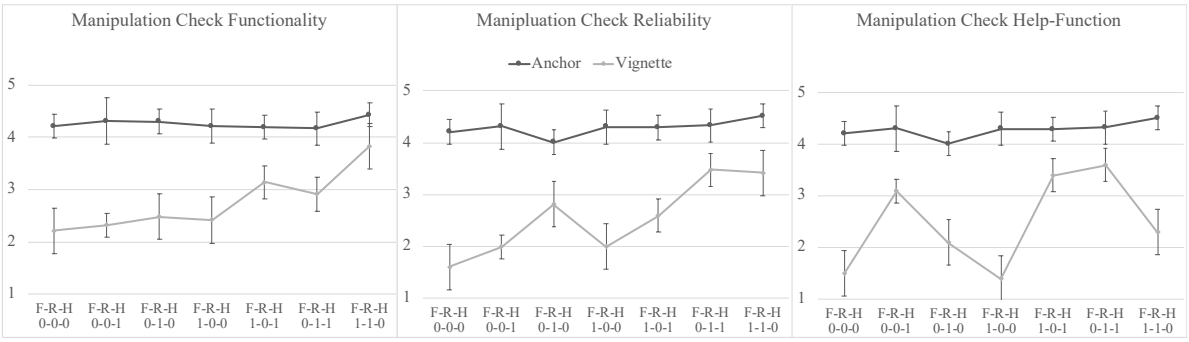

Figure 22. Results of the manipulation check for the functionality, reliability and help-function constructs.
F = Functionality, R = Reliability, H = Help-Function; 0 = low condition, 1 = high condition; Error indicators are standard deviations. Y-axis indicates participant response on a 5-point Likert scale ranging from 1 (strongly disagree) to 5 (strongly agree)

Main analysis and post-hoc testing. As for the main effect of the repeated measures between-within factorial ANOVA, a significant effect of the repeated measure was identified, with $F(1.35,208.5) = 52.98$, $p < .05$, $\eta^2 = 0.26$. The main effect of the between factor, however, was not significant, with $F(6,154) = 0.35$, $p = .91$, $\eta^2 = 0.01$. The between-within interaction effect was not significant either ($F(8.12,208.5) = 1.86$, $p = .07$, $\eta^2 = 0.07$), as can be seen in figure 23). The Bonferoni corrected post-hoc tests reveal a significant difference between each the baseline and vignette condition ($t(160) = 8.49$, $p < .05$), anchor and vignette condition ($t(160) = 6.41$, $p < .05$) as well as between the baseline and anchor condition ($t(160) = 3.24$, $p < .05$).

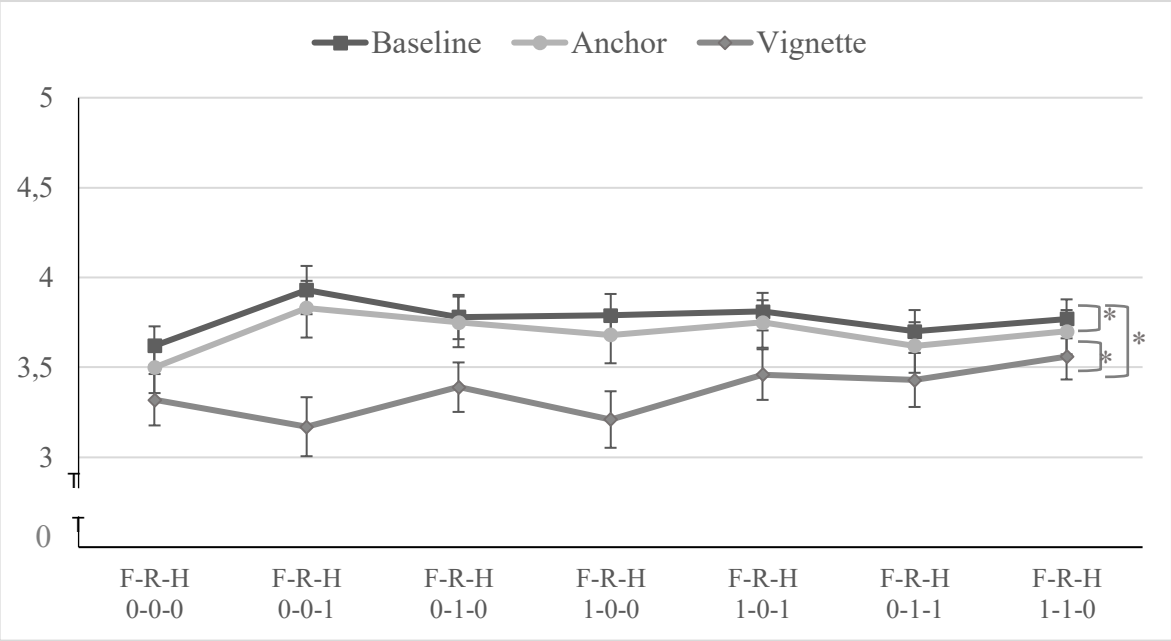

Figure 23. Results of the baseline, anchor and vignette condition.
F = Functionality, R = Reliability, H = Help-Function; 0 = low condition, 1 = high condition; Error indicators are standard error of the mean; Y-axis indicates participant response on a 5-point Likert scale ranging from 1 (strongly disagree) to 5 (strongly agree).
* Indicates a significant difference between the repeated measures, with $p < .05$

The post-hoc contrast testing revealed no significant overall difference between the seven vignette conditions regarding the difference of trust from t_2 to t_3 ($F(6,154) = 1.82$, $p = .10$, $\eta^2 = 0.07$, see figure 24). As the main effect of this ANOVA was not significant, no further contrast testing was performed.

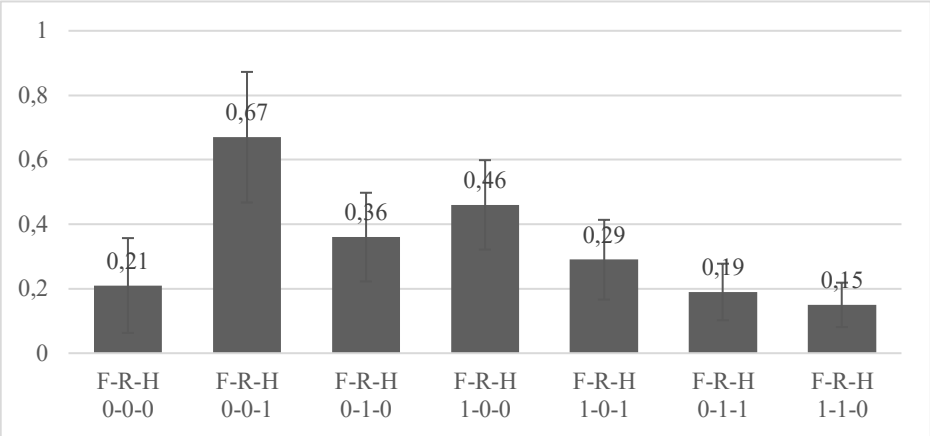

Figure 24. Bar-Chart of the difference of trust from the vignette condition to the anchor condition.
F = Functionality, R = Reliability, H = Help-Function; 0 = low condition, 1 = high condition; Error indicators are standard error of the mean. Y-axis indicates the difference from the anchor to the vignette condition, as measured on a five-point Likert scale

Follow-up analysis and co-variates. The additional follow-up analysis regarding the individual influence of the functionality, reliability and help-function constructs on ability, integrity and benevolence respectively revealed no significant difference between the seven conditions for ability ($F(6,154) = 1.8$, $p = .09$, $\eta^2 = 0.07$), integrity ($F(6,154) = 1.67$, $p = .13$, $\eta^2 = 0.06$) or benevolence ($F(6,154) = 1.71$, $p = .12$, $\eta^2 = 0.06$).

In the final analysis of co-variates, age, and propensity to trust in technology were examined as covariates. The correlation of age and trust at t_3 ($r = .1$, $p = .19$) as well as the correlation of propensity to trust and t_3 ($r = .07$, $p = .35$) were not significant. The two final ANOVAs revealed no significant difference in general propensity to trust between the seven groups ($F(6,154) = 0.77$, $p = .59$, $\eta^2 = 0.03$), nor a significant difference in age ($F(6,154) = 1.51$, $p = .18$, $\eta^2 = 0.06$).

9.5. Study Specific Discussion

Trust within digital environments is more complex than trust within face-to-face contexts, as multiple trusting relationships must be considered (e.g. trust in the internet, trust in the digital technology, and trust in a communication partner; Beldad, et al., 2010; Söllner, et al., 2016). Therefore, it was the aim of this study to examine multiple trusting relationships within the context of the coach-athlete relationship. Specifically, both the trust in coach, as well as trust in a coach-implemented training and communication technology was examined, in order to identify possible trust-transfer effects as specified in the model of trust through digital communication within the coach-athlete relationship. Drawing conclusions from other trust-transfer studies, it was assumed that a negative trust transfer would occur from the coach-implemented technology to the coach itself.

The first hypothesis of this study was that a negative trust transfer would occur through the antecedents of functionality, reliability and help-function: i.e. when some or all of the antecedents are perceived as low, the trustworthiness of coach will also be lower than without the technology, or highly trustworthy technology. The main analysis reveals a significant effect of the within-subject measurement, confirming this first hypothesis. The trust measured after the vignette manipulation was lower than trust either at baseline, or at t_2 anchor condition where trustworthiness of technology was high. This indicates that, indeed, trust in coach suffered detrimental effects when recommending or implementing technology that was not trustworthy. If the technology was highly trustworthy, however, there was no effect on trustworthiness of coach.

In this analysis, the between-subject factor did not indicate a significant difference between the seven vignette conditions, suggesting that each of the factors dealing with

trustworthiness of technology had a similar impact on trustworthiness of coach. Still, a follow-up analysis was done to specifically test the second hypothesis, looking at only the difference between the seven vignette conditions.

The second hypothesis addressed the individual impact of the three trust in technology antecedents: It was assumed that the factor help-function would have the least detrimental effect for trust in coach. The reasoning behind this assumption lies within the relationship of the help-function with the interpersonal trust factor benevolence (Lankton & McKnight, 2011), as well as in the decreased impact of the benevolence factor early on in relationships (Mayer et al., 1995) and the low relevance estimation in the pilot study. As for the factors of functionality and reliability, no individual impact of these factors was hypothesized, as in general the McKnight and collages (2011) model does not specify individual impact of any one of the antecedents. In order to test this, an analysis was run using the decrease of trust from anchor to vignette condition. The difference in trust was calculated from the t_2 anchor condition (where technology was highly trustworthy), to the t_3 condition (wherein specific aspects of technology trust were manipulated). By comparing only this between-subjects factor, the goal was to determine if trust was affected differently from one vignette to another. However, this second hypothesis could not be confirmed. The post-hoc analysis revealed no significant main effect, which is why no further contrast testing was conducted. The analysis indicates that while the trustworthiness of coach suffered through untrustworthy technology, it is not possible to determine which trust in technology antecedent was most or least relevant for this to occur. None of the trust in technology antecedents had more or less impact on trustworthiness of coach than the others.

The low relevance rating of experts in the pilot study for the help-function was part of the reason to assume the smaller impact of this construct. However, this assumption was not confirmed. Part of the reasoning experts provided was, that a help-function is in fact not necessary, when compared to the option of doing an online search when encountering difficulties with a technology. Because of this, the vignette was constructed in a way that it compared the help-function with an online search. The manipulation check provides valuable insight here (the manipulation check will be discussed in more detail at a later point in the discussion): The manipulation check reveals that indeed the help-function was rated higher in those vignettes with a positive help-function than in those vignettes where an internet search had to be conducted. This suggests that the help-function is indeed perceived as useful by the participants of this study and therefore might explain why the second hypothesis could not be confirmed.

However, there were also some theoretical assumptions leading to the hypothesis that the help-function would have the least impact, which will be addressed here. The assumption that the help-function would have the least impact is in line with research indicating that benevolence, the interpersonal trust antecedent corresponding with the antecedents help-function, is least important when it comes to assessing the trustworthiness in short term working teams: Jarvenpaa and colleagues (1998) found that both ability and integrity had more impact on trust in temporary working teams. Similarly, Robert, Dennis, and Hung (2009) found benevolence to be the least important trust antecedent when examining temporary work teams and swift trust. However, these findings do not seem to translate to the trust in technology antecedents. No difference in the impact of the antecedents was found, despite the technology being newly implemented.

Mayer and colleagues (1995) argue that the benevolence factor is not per se less important than the other factors. Rather, they suggest that all three factors are equally important. Mayer and colleagues (1995) merely argue that the benevolence antecedent requires more time to be assessed accurately and to develop its full impact for the decision to trust or not. This, too, was validated through the results of study one, wherein benevolence was assessed highest through face to face communication, and low for digital interactions, where less information was gathered. Yet, for the current study on trust transfer-effects, this does not hold true. A possible explanation might be that unlike with interpersonal trust and benevolence, the help-function of trust in technology might be especially important early on when working with a new technology. Especially then, a help-function would be beneficial, in order to learn how to properly use the technology. The technology implemented within this study was new to all participants, which is why the help-function of the software might have been perceived as useful after all. However, further studies would be necessary to test this hypothesis.

In summary, the results thus far suggest that trustworthiness of coach can suffer detrimental effects, if the technology implemented by coach is perceived as being untrustworthy, independent of which factors of technology trustworthiness are lacking. While this finding in general is in line with other studies on trust transfer (e.g. Lee, Kim and Ahn, 2011; Stewart, 2003;), it extends the current research by a few key points: On the one hand, this is the first study to show trust-transfer from technology to a person. On the other hand, this study shows the occurrence of negative trust-transfer effects. Thus, the study offers a unique and new insight into the trust-transfer research, with important repercussions both for future research and practice.

The results suggest that it will be vital for coaches implement new training technologies to ensure they are trustworthy. It is crucial for coaches to ensure that technologies they wish to use within the coach athlete relationship have the required functions, are reliable and offer a help-function. If the technology is perceived as untrustworthy by athletes, it will be important for coaches to double their efforts in ensuring their own trustworthiness and implement strategies of trust repair.

As for future research, many new avenues open up: As this study is the first to show trust transfer from technology to people is possible, further research can now look at the exact mechanisms under which this transfer occurs. This study examines transfer of coach-implemented technology, thus ensuring a connection and similarity of the technology and coach. Future research could examine whether this is really necessary for transfer to occur, or if transfer would also occur if the technology is not specifically implemented by coach. Furthermore, future research might examine whether positive trust transfer effects occur as well. The current study specifically examines whether detrimental effects can happen. However, the general research model would also suggest positive trust transfer effects. It is possible that a trustworthy technology might be implemented by coach as a trust-repair strategy. Future research can examine if this is a feasible strategy.

Furthermore, research might examine the relationship between the trust in technology and interpersonal trust antecedents more directly. The main purpose of this study was to examine the impact of the individual trust in technology antecedents on a global assessment of coach's trustworthiness. The individual impact of the trust in technology antecedents on the interpersonal antecedents of ability, benevolence and integrity was addressed only as a follow-up analysis. Within this sample, the results suggest that no individual impact of functionality, reliability and help-function on ability, integrity and benevolence respectively can be discerned. There was no overall difference on any of the three interpersonal trust antecedents between the seven vignette conditions. However, future studies need to examine this relationship directly and address it as the main point of interest within a study, rather than as a follow-up analysis in order to gain a better understanding of the relationship.

Apart from these main analyses, some covariates were also examined: Propensity to trust technology was assumed might have an impact on the relationship between the trust in technology antecedents and the trustworthiness of coach. Similarly, it was assumed that age might be a relevant covariate, influencing the effect the untrustworthy technology had on the perception of coach trustworthiness. The results, however, reveal that none of the examined covariates had a significant effect. This indicates that the detrimental effect of untrustworthy

technology on trust in coach shows a wide applicability within this sample. Regardless of age or individual propensity to trust technology, trust in coach suffered similar detriments.

The results of this study provide solid insight into the relationship between trust in technology antecedents and interpersonal trust antecedents. The vignette manipulation of the trust in technology antecedents appears to have worked very well: The manipulation check reveals that especially for the reliability and help-function vignettes, the assessment of reliability and help-function by the participants varied in the expected way. When the vignette described reliability to be high, participants assessed the reliability as high, while the reliability was assessed as low, when the vignette described it as low. The same can be said for the help-function. However, the manipulation of the functionality vignette appears to have not worked so well: in two conditions, the perception of the functionality does not match the manipulation through the vignette.

The mostly positive manipulation check indicates that the chosen vignettes matched the intended constructs very well. The results and conclusions drawn on the basis of the reliability and help-function constructs are grounded in a firm theoretical and methodological basis. As for the functionality construct, in five out of the seven vignettes, the manipulation appears to have worked as well. Merely in two instances the rating by the participants deviates from the expected rating. Thus, some caveats must be considered: One possible explanation lies in the correlation of the functionality construct with the other two dimensions. In the original validation of the trust in technology model, McKnight and colleagues (2011) find medium to high correlations between the three antecedents, with $r = .63$ for the functionality and reliability and $r = .50$ for functionality and help-function. Similar results were found in the German validation of this questionnaire conducted in study two of this research, finding functionality and reliability to correlate at $r = .71$, while functionality and help-function correlation at $r = .56$. This is also confirmed by the impression from the pilot study, wherein the experts often found it difficult to distinguish the functionality vignettes from the vignettes of the other two constructs. The vignette chosen for the current study showed fairly good distinction between the three constructs in the pilot measure. Yet, this is still a plausible explanation as to why the manipulation appears to not have worked in two cases. In the one case, the functionality was assessed low, despite the vignette describing the relevant functions as high. However, in this vignette, the other two constructs were described as low (i.e. the 1-0-0 vignette). Therefore, it is likely that the participants judged the functionality as low, due to spill-over effects from the other vignettes. A similar explanation can be used for the second vignette wherein the manipulation did not work: Functionality was perceived as high, even though the vignette

described the functionality as low, because the two other constructs were described as high, and this again has a spill-over effect.

Despite the overall solid methodological approach and interesting findings, some limitations must be considered, when interpreting the results. First, it is important to bear in mind that the manipulation of the functionality did not work in all instances. Thus, any conclusions about the role functionality plays in impacting interpersonal trust must be interpreted with caution. Similarly, the interpretation of actual trust-transfer effects must be done with caution: The current study specifically examined the effect trust in technology antecedents had on interpersonal trust. The study does not examine how trust in technology affects interpersonal trust. This is a fine, but relevant difference. The current study did not actually assess the overall perceived trustworthiness of the technology, but only assessed sub-facets. Therefore, it is not possible to draw conclusions about the transfer of actual trust. Rather, the study reveals that factors affecting one trustee (i.e. the technology) can transfer and affect another trustee (i.e. the coach).

In addition to these conceptual limitations, some general methodological limitations must also be considered: In general, the external validity of vignettes within trust research has been questioned (Barrera, et al., 2012). Because the vignette situation in general has no real-world implications, there may well be a difference between how people indicate they might react, and how they would in fact react in a real-world situation. Thus, participants in this study indicate that they perceived coach to be less trustworthy. However, no conclusions can be drawn about how they would react in a real-world situation, and whether the detrimental effects on coach's trustworthiness would translate to actual impairments in coach trust. The actual consequences of the decreased trustworthiness in coach remain vague.

Furthermore, the sample collected for this study must be considered as a limitation. Due to the large number of drop-outs in the study, it was not possible to collect a sample of only athletes. While most participants indicated being at least a little bit active, many are merely recreational athletes. Therefore, the results appear to be most applicable to a recreational sport level, wherein athletes seek a personal trainer to improve upon a personal training goal. Indeed, the sport orientation of the sample, determined through the sport-orientation questionnaire, indicated that most athletes could emphasize very well with the self-improvement goal described in the general vignette situation. The sport orientation questionnaire indicates that overall, the sample reached a mean of win-orientation of M_{wo} = 17.2 (SD = 8.82), a mean goal-orientation of M_{Go} = 22.38 (SD = 4.95) and a mean competition-orientation of M_{co} = 38.15 (SD = 12.18). Comparing these scores with the norm-values provided by Elbe (2004) suggests that

overall the sample scored comparatively low on the win- and competition- orientation scores when compared to adult elite athletes, indicating this sample definitely consisted of more recreational athletes. The goal-orientation, on the other hand, is relatively higher, indicating that this sample was overall more interested in self-improvement. Thus, it is likely the participants could easily emphasize with the constructed situation and vignettes. As for the generalizability of the overall results, some caveats must be considered: The applicability of the results to an elite level can be questioned and must be considered as limited, while the applicability to a recreational sport level is more certain.

Conclusion

Despite the methodological and conceptual limitation, overall this study provides new and valuable insight into the relationship of multiple trustors within the complex field of trust through digital communication. The study is the first to show that negative trust-transfer effects can occur from an untrustworthy communication-medium to a person implementing the use of this technology. This result is shown within the field of the coach-athlete relationship, by showing that coach-implemented technology can have detrimental effects of the perception of coach's trustworthiness through the factors functionality, reliability and help-function. The findings from this study suggest that coaches must be careful when implementing new technologies into existing relationships by either ensuring the trustworthiness of the technology, or else by employing trust-repair strategies. The results appear to be especially applicable to a sport and exercise setting with recreational athletes. Finally, the study provides a good starting point for further investigation of trust transfer-effects from technology to people, examining possible mechanisms and the individual impact of the antecedents functionality, reliability and help-function on the factors of ability, integrity and benevolence.

III Discussion

10. Discussion

The goal of this thesis was to examine both direct and indirect effects digitally mediated communication have on the perception of trustworthiness within the coach-athlete relationship. In order to examine this research question, a model of trust within the coach-athlete relationship through digital communication was developed, and three separate studies examined various aspects of the model. This thesis was the first to specifically examine the impact digital communication can have on the development of trust between coach and athlete. By implementing a range of different methodological approaches and basing the research on well-established models and theories, the current research offers valuable insight into the development of trust in coach.

Overall, the results indicate that digitally mediated communication within the coach-athlete relationship can affect the perception of trustworthiness. Specifically, the following can be said: The current research did not find a direct effect of the digital context, i.e. the perception of coach's ability or integrity did not vary as a function of context alone (study 1). There were no differences between digital or face-to-face communication contexts. Merely the perception of benevolence appears to be affected by the context, as benevolence was perceived as lower through digital communication, compared to face-to-face. Furthermore, the research validated a model of trust in technology for the specific context of sports and exercise technologies (study 2). This study found that the antecedents of functionality, reliability and help-function validly and reliably measure specific trusting beliefs, while a general propensity to trust technology and institution-based trust explain initial trust in an exercise technology. Building upon the results of study one and two, the final study found that untrustworthy technology can negatively affect the perception of coach's trustworthiness (study 3). Participants perceiving a technology to have poor functionality, to be unreliable, or to lack in a help-function were more likely to perceive their coach as less able, benevolent or integer, when coach is the one implementing the technology use.

These are, briefly summed up, the key conclusions from the current research. In the following discussion, the results of the three studies will be interpreted in light of the proposed research model, as well as within the context of other research. Additionally, possible adaptations to and limitations of the applicability of this model will be discussed (10.1.). In a second step, the general applicability of the model to future practice and research will be discussed, highlighting what the current research has contributed to the fields of coach-athlete research, as well as to trust research, and discussing ideas for further research (10.2.). Some limitations of the present research must also be kept in mind and will thus be discussed in

Chapter 10.3.. In a final step, an overall conclusion will be drawn, summarizing across the entire body of this research (11).

10.1. Discussion of the Proposed Model

This thesis proposed a model of the development of trust within the coach-athlete relationship through digital communication. The model is based on the integrated trust model by Mayer and colleagues (1995), the model of trust in technology by McKnight and colleagues (2011), as well as Jowett's 3+1 C's model of the coach-athlete relationship (Jowett, 2007). The model integrates these three approaches, allowing hypotheses to be formulated about how the different trust models interact with each other, and individually as well as conjoinedly affect the coach-athlete relationship. The model specifies that the interaction and communication through a digital technology (e.g. app, training platform or tracking watch) can either mediate the perception of the trustee's ability, benevolence and integrity, thus affecting interpersonal trust (through the mediator role of technology), or else function as the trustee itself (through the trustee role) and therefore directly affect interpersonal trust or relationship outcomes. The three studies conducted within the thesis individually address various aspects of the model, as depicted in figure 25. The figure shows where each of the studies can be embedded within the model. Additionally, the figure depicts some slight adaptations to the model, compared to the original model proposed on p 106 in the introduction of this thesis. Finally, the figure also reveals where further research is still needed, in order to establish more clearly certain proposed relationships. The following paragraphs discuss in more detail the results of each study and how the relate back to the model.

Study 1. The first study examined the mediating effect communication through a technology can have. Thus, the research addressed a call from IS research, to examine technology in various roles (Öksüz et al., 2016). In order to investigate how the digital context mediates the perception of trustworthiness, an elaborate experimental design was implemented, examining the development of trust in coach over a four-week running training. Over the course of the four weeks, participants either received purely face-to-face interactions with their coach, a mix of both face-to-face and digital communication, or thirdly, purely digital communication. The results of this study suggest that the context of communication in itself does not have much impact on how the trustworthiness of coach is perceived. The mediating role of digital communication showed minimal impact in this study. Only the interpersonal trust antecedent of benevolence appeared to be perceived differently though face-to-face communication, compared to digital communication. However, it remains unclear whether this effect might diminish over time.

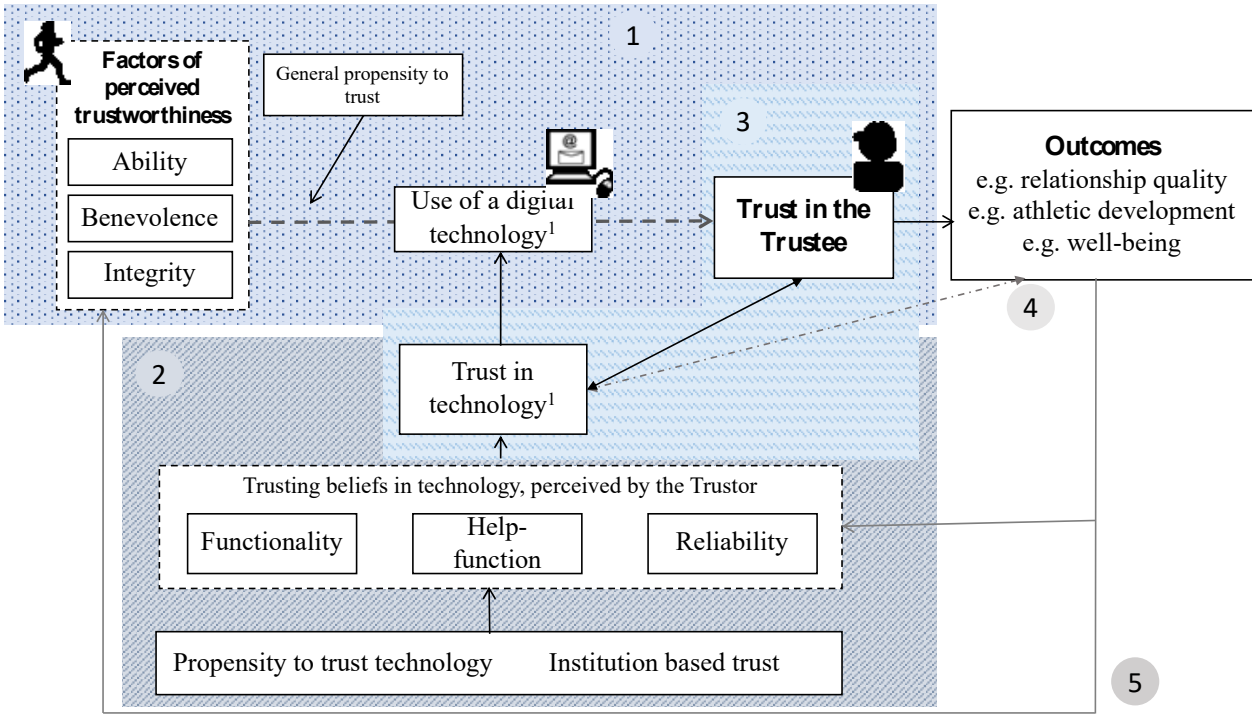

Figure 25. Revised model and indication of model aspects examined by the studies.
[1]Technology in this model refers to any type of technology used, ranging from simple e-mail communication, to communication through instant messenger, app, training platform or wearable
(1) Study one examined technology in the mediator role; the dotted line indicates that this relationship could only in part be confirmed. (2) Study two examined technology in the trustee role. The model of trust in technology could be confirmed. (3) Study three examined trust transfer effects between trust in the technology and trust in coach. The results confirm a relationship between the two, as a negative transfer was found. (4) The proposed direct impact of trust in technology on relationship outcomes was not examined. Future research is needed to investigate this relationship. (5) The proposed feedback loop and influence of relationship outcomes on both technology trustworthiness and trustee trustworthiness was not examined, and longitudinal research is needed to examine this relationship.

While these findings do not entirely confirm the relationship proposed by the model, they are in line with research suggesting that benevolence is the antecedent most difficult to discern, impacting the perception of trustworthiness mostly within long-term relationships (Mayer, et al., 1995). Other studies have found benevolence to be less impactful for short-term working relationships and the development of swift trust (e.g. Jarvenpaa & Leidner, 1999). This would suggest that especially for new relationships, face to face interactions are necessary, for trustors to accurately perceive the antecedent benevolence. The perception of this antecedent is affected through the digital interaction, and the technology mediates how it is perceived.

With regard to the proposed model, this means the suggested mediating role of technology appears to have only minimal impact, that is most prominent for new relationships (and most

prominent for the perception of benevolence). As for longer lasting relationships and the feedback-loop proposed in the model, it is questionable whether the proposed mediating effect of technology would withstand. The mediating role of technology may only be important for initial contact and early interactions. As for existing relationship, it is possible that this part of the model can be left out. Further research is needed to more clearly discern the mediating effect of digital communication (Section 10.2.).

Study 2. The second study addressed technology in the trustee role, examining the model of trust in technology (McKnight et al., 2011), and its viability within the context of sport and exercise technologies. This was done, as it is important to validate the model of trust in technology for the specific technology under examination, as trust is object and context specific (Gefen, et al., 2003). This study served a two-fold purpose, as it not only validated the model of trust in technology for the specific context of sport and exercise technologies, it also validated the model and accompanying questionnaire for the German language. The original model and questionnaire were translated through a forward and backward translation, and modifications were made for the specific technologies of interest. The model was adapted in a way that it fits a wide range of sport and exercise technologies and is thus applicable to many different research settings.

Overall, the study showed that this part of the proposed model works very well. The adaptation of the trust in technology model showed that measuring trust in a training technology is possible through a mixture of initial trust and knowledge-based trust (McKnight, et al., 2011). The proposed model appears to be best applicable to users who are familiar with a specific technology. The model has the advantage that, besides knowledge-based trust in the specific technology, it incorporates other aspects of the technology, i.e. the trust in the developers and a general propensity to trust technology. Thus, the model incorporates the complex relationships surrounding trust in technology. This is incorporated into the model of trust in the coach-athlete relationship through digital communication

Study 3. The third study addressed trust transfer effects, examining the effect of trust in technology on the trustworthiness of coach. The goal was to examine interaction effects between the interpersonal trust and trust in technology, in order to identify combined or individual impact on the trustworthiness of different trustees (e.g. coach, athlete, or technology) on relationship outcomes. The current thesis is the first to comprehensively employ different trust models in order to examine the complex nature of trust in digital environments: As digital environments inherently include multiple trustees (e.g. trust in the internet, trust in a technology, trust in a service provider or interaction partner), research has called for the

examination of the relationship among the trustees (Beldad, et al., 2010; Söllner, et al., 2016). Study three addresses this call.

The study was able to show that trust in a technology can affect the perception of the human trustee's trustworthiness. While other studies have shown trust transfer to occur from online to offline services (e.g. Lee, et al., 2011; Steward, 2003), this is the first study to show trust transfer from one type of trustee (i.e. technology) to another type of trustee (i.e. coach). Thus, this study extends existing knowledge on trust transfer and offers new insights and avenues for future research, which will be discussed in more detail in section 10.2.. With regard to the proposed model, the results indicate that the suggested relationship between trust in the human trustee and trust in the technology is a significant and important relationship. The direct impact of the trust in technology on the trust in the human trustee (in this case the coach) validates this specified relationship within the model.

Overall, the three studies conducted throughout the thesis have shown the feasibility of several aspects of the proposed models: Both the trust in technology model, and the relationship between trust in technology and interpersonal trust were confirmed. Merely the mediator role of technology could not fully be confirmed and must be considered with some caveats. However, some aspects of the model have not been tested, as is indicated in figure 25: What the current research fails to address, is the model-proposed direct influence of trust in technology on relationship outcomes. Future research therefore might look at this influence and examine whether the trust in technology (or lack thereof) might have a direct positive (or negative) impact on relationship outcomes besides trust, e.g. well-being or overall relationship quality. The current thesis has not examined this relationship. This relationship was specified on the basis of other study, examining trust in technology and indicating that trust in the technology influences outcomes such as technology acceptance or increased technology use (e.g. Gefen et al., 2003; Wang & Benbasat, 2005). It was hypothesized that such outcomes would also transfer across the coach-athlete relationship, with trust in technology directly and positively influencing overall relationship quality, while poor trust in technology would directly and negatively influence overall relationship quality. However, no studies have examined this direct influence yet, making it purely hypothetical at this point. The impact of, for example, untrustworthy technology on satisfaction with the relationship, or even outcomes such as athletic success must be examined through future research.

The proposed model and derived research relied heavily on the interpersonal trust model by Mayer and colleagues (1995). This conceptualization of trust was chosen for its applicability to the coach-athlete relationship and previous adaptation to the sporting context in general

(Dreiskämper, et al., 2016). However, other conceptualizations of trust might also show merit: Wei and Yucetepe (2013), for example, propose differentiating between goodwill trust and competence trust. Especially within this context, one might hypothesize the implementation of goodwill trust when examining trust in coach, while applying competence trust in the technology. Goodwill trust would be applicable to the coach-athlete relationship, as a complex interpersonal relationship, incorporating mutual liking, trust, and a co-orientation. Thus, the trust an athlete has in their coach can be described as goodwill trust. The trust in the technology used within the coach-athlete relationship, might then be examined through competence trust, where not sympathy or liking are important, but solely the technology's abilities. When assessing whether to trust the technology or not, only the abilities of the technology are important for the athlete to decide to trust or not. However, neither of these constructs have been previously applied, neither to the coach-athlete relationship, nor to trust in technology. Thus, it is difficult to say how well this model would suit the current research aim. The proposed model of trust through digital communication in the coach-athlete relationship incorporates two well established models that have also been applied to the context of sport before. The interpersonal trust model focuses both on affective and emotional components, as well as on cognitive components in the assessment of trustworthiness (Schoorman, et al., 2007), thus incorporating different aspects portrayed through the goodwill and competence trust model.

Overall, the current thesis suggests good applicability and viability of the proposed model of trust within the coach-athlete relationship through digital communication. The model of interpersonal trust is theoretically well founded, within trust research (Mayer et al., 1995), as well as within sport research (Dreiskämper et al., 2016). Similarly, the model of trust in technology is well founded in trust in technology research (McKnight et al., 2011) and has been validated for the current context (in study two). Furthermore, the proposed outcomes of trust in coach are theoretically derived (Jowett, 2007), as well as empirically examined (e.g. Zhang & Chelladurai, 2013). The proposed model incorporates various trusting relationships within a digital context and accounts for the forming of specific relationships between the different trustees. The empirical examination of the proposed relationships within the model suggests good applicability. In its current form, the model already allows some recommendations for practice, as well as contributions to research and further avenues for future research. However, there are some aspects of the model yet to be specifically tested, which can be addressed by future research. The following section first highlights contributions of the thesis to practice and research, before discussing ideas for future research.

10.2. Strengths, Contributions and Directions for Practice and Research

Application of the model to coaching practice. The model developed within the present thesis provides some merit for application into practice: The model suggests how coaches can establish trust of their athletes. It is particularly important to bear the effect of the trust in technology in mind. The model offers specific aspects to control, especially when implementing new technologies: Coaches must assess the functionality, reliability and help-functions of new technologies and be sure that the technologies are trustworthy. For example, if a coach wishes to implement a new training application tracking fitness and communicate via a website, the coach should first ensure the technology provides all necessary functions. It is important that the technology offers all the functions necessary for both coach and athlete to achieve their training goal. Furthermore, it is vital for coach to make sure the device operates reliably. Having the necessary functions alone is not enough if they only work half the time. Lastly, the model suggests that coach should make sure the technology has a proper help-function offering guidance and advice to the athlete. Thus, the model offers coaches clear and specific factors to focus on when choosing new technologies. When implementing a technology that proves to be not trustworthy, coaches must try to remain trustworthy themselves and possibly resort to trust repair strategies when necessary.

Furthermore, the model and current results suggest that if coaches engage in a new relationship with an athlete entirely through digital communication, it is particularly important for the coaches to take time and convey their benevolence. They must keep in mind that it may take a little bit more time for trust to build, at least with regard to that specific antecedent. Beyond this factor, however, the model suggests that coaches must not fear detrimental effects when solely relying on digital communication. If the content of their communication indicates they are trustworthy, it will convey their trustworthiness, regardless of whether they communicate through digital channels, or direct interactions. The content of communication and with it the antecedents ability and integrity are perceived the same way as through face-to-face communication. Overall, the current research and model suggest that when implementing trustworthy technology, the benefits of digital technology, i.e. higher accessibility and connection of coach and athlete across great distances, can be reaped without fearing detrimental effects on the perception of trustworthiness. Coaches can introduce and use technologies to connect with their athletes and collect large amounts of objective data about their athletes' performances. The benefits appear to outweigh the risks of these technologies for coaches.

Coach-athlete relationship research. Besides these implications for practice, the current research has contributed to both the fields of coach-athlete relationship research, and trust research. On the one hand, the research offers valuable insight into trust within the coach-athlete relationship. While some studies have previously examined outcomes of trust in coach (e.g. Dirks, 2000; Zhang & Chelladurai, 2013), the current research focused on trust antecedents and the development of trust. It is one of the first to base the coach-athlete relationship trust research within the larger context of overall trust research. Thus, it offers a theoretically grounded model of how trust within the coach-athlete relationship is built. While much previous research has shown the effects of a trusting relationship, this research focused on how this essential trust can be built. The model shows which factors are important for athletes to perceive their coach as trustworthy. In future research, the model can be used to derive hypotheses on how trust is developed in the coach-athlete relationship and make predictions on possible outcomes.

Another avenue for future research might be to look at the coach-perspective while implementing the research model. The current research focused solely on the athlete perspective and how trust in coach is developed. Yet in general, the model is formulated in a way that it explains athlete trust in coach, as well as coach trust in athlete. One interesting avenue for future research, thus, would be to examine whether the opposite perspective holds true as well. It is worth investigating which effects technology use has on coach's' perception of athlete trustworthiness through digital technology, as well as examining which outcomes might be affected. Overall, research on the coach-athlete relationship has emphasized the athlete perspective more closely, examining which coaching behaviors affect various aspects of the athlete. However, research also argues that it is important to examine the opposite direction, i.e. how do the coach-athlete relationship and athlete behaviors affect coach and their outcomes (Jowett, 2007). Very little research has focused directly on coach perspective when it comes to the influence of the coach-athlete relationship. Nicholls and Perry (2016) use actor-partner analysis to examine both coach and athlete perceptions of stress and coping with the coach-athlete relationship. Their results indicate that the relationship quality is important for coaches' stress coping. However, overall there is little research directly examining coaches' perceptions of the coach-athlete relationship. Future research should therefore fill this gap in research by addressing directly the impact of the relationship, as well as trust from the coach perspective, for instance by implementing the proposed model. Research, for example, might address how technology use impacts coaches' perception of athlete trustworthiness, or else examine specific impacts of trust in athlete on relationship outcomes.

Finally, another avenue for coach-athlete research would be to look at other topics of communication and how those might affect trust. The current research focused on new or else well established and positive coach-athlete relationships and communication focused mostly on training plans and every-day coordination. Future research might examine how conflict resolution and critical communication (e.g. negative feedback) through digital channels affect trust within the relationship, as well as the overall relationship quality. Research has identified interpersonal communication as an essential element within the coach-athlete relationship, especially when it comes to conflict resolution (LaVoi, 2007; Wachsmuth, Jowett, & Harwood, 2017). A break-down of communication between coach and athlete and a failure to adequately communicate emotions and cognitions in particular have been identified as both triggering and perpetuating reasons for conflicts (Wachsmuth, et al., 2017). However, research has not specifically looked at the role both interpersonal or digital communication play within this process. The current research merely allows insight into the development and maintenance of positive relationships. Future research must now look at how well conflict resolution and trust repair can function through digital communication.

Trust research. With regard to trust research, the current thesis expands the existing knowledge by a few key points. On the one hand, the current research adapted a model of trust in technology to a specific context and validated it. Thus, it followed a call for examining trust in technology in a particular context (Gefen et al., 2003) and provides a valid and reliable measure of trust in a specific training technology, as well as initial trust based on institution-based trust and structural assurance. Thus, the model can be used to examine, for example, the effects of trust in technology on actual exercise behavior. As trust in technology is a predictor of actual technology use, the increases trust in a training technology might lead inactive people to use this technology more and thus be more active.

Most importantly, however, the current research shows that trust-transfer can occur from technology to people. This is a significant and new contribution to trust research. The current research is the first to show that this transfer effect occurs, which has implications not only for the coach-athlete relationship but would be applicable to other contexts of digital interactions and communication as well. Future research can therefore more closely examine in which situations and contexts trust transfer occurs and which mechanisms are important for this. In this research, the technology was implemented by coach, affiliating coach with the technology. As existing research suggests a strong associating and similarity are important for trust transfer to occur (Lee, et al., 2011), it was assumed that it was necessary for coach to implement the technology use in order for trust transfer to occur. However, future research might examine

whether these associations are really necessary for trust transfer to occur from people to technology. Future research might examine more closely which mechanisms or contextual factors are necessary for trust transfer to occur. A better understanding of the circumstances in which a transfer from technology to interaction partner take place can help future practitioners to avoid the negative effects of poorly functioning technology. Similarly, research might examine the specific influence of individual trust in technology antecedents on individual interpersonal trust antecedents. Understanding which antecedents affect the trust transfer can help to explain the underlying mechanisms. The model in its current form does not specify an impact of individual antecedents, nor does it suggest a relationship. Yet future research could expand upon the existing model and examine this relationship. Lankton and McKnight (2011) suggest a conceptual shared core of the trust in technology and interpersonal trust constructs, which might be indicative of relationships for future research to address.

Finally, another line for future research can be to take another, closer look at the mediating role of technology. In the current research, little impact of mediating technology could be identified. Future research might therefore address this mediating role of technology in more detail, examining its impact both within existing and new relationships, in order to discern whether the effect changes over time. The current study found detrimental effects of the digital communication only for the perception of benevolence. As this antecedent requires more time to be accurately perceived (Meyer, et al., 1995), it would be interesting to examine how this effects changes over time. It is unclear whether, as time and the relationship progress, the perception of benevolence through digital communication would match the perception through face-to-face communication. Especially longitudinal studies would be of interest here, in order to discern whether newly implemented technology would have a bigger impact on the perception of coach's trustworthiness. Further research might thus be used to test the feasibility of this specific path in the model and adjust it, as needed.

10.3. Theoretical and Methodological Limitations of the Current Research

As all research, the current thesis is not without its limitations. These will be addressed in the following section. One major limitation of the current work lies within the sample: All studies were conducted with mostly recreational or hobby athletes, thus limiting the transferability of the results to other areas. The samples for each of the studies were drawn based on availability. Especially for study one, a complex experimental set-up, it would have been difficult to gain access to elite athletes. For study two, the large and broad sample collected here allows for the broadest transferability of the three studies. The sample validating the trust in technology model included both athletes and non-athletes, thus allowing conclusions to be

drawn for many different contexts of sport and exercise technology application. As for study three, the vignettes were formulated to better suit a recreational or ambitions hobby athlete. The sample also consisted mostly of recreational athletes. The general situation description would also be applicable to a more elite setting, with similar constellations of technology use and coach-athlete interaction. The viability of the vignettes was assessed by both elite athletes and athletes with a more recreational focus, and the overall realism of the situations was judged high, suggesting applicability within both settings. However, overall the current thesis examined the proposed model within a more recreational sport and exercise setting. Conclusions drawn from these results for an elite sport setting are limited and require further testing for firm conclusions. Overall, the general model suggests viability and applicability to the elite sport setting. Future research might want to apply the model to this setting and examine specific hypotheses within this setting.

Some methodological limitations have already been addressed within each individual study discussion. Overall, the mix of different methodological approaches, from experiment, to survey design and vignette study offers a very broad access to the subject matter. While each individual approach has its advantages and disadvantages, the mix of approaches counterbalances this. All studies share the methodological limitation that the main method of data collection was through questionnaires. While all questionnaires used indicated good reliability and have been validated for the specific context in which they were implemented, they still share the limitation, that oftentimes questionnaires are transparent and can be answered in a socially acceptable way. If participants, for example, assumed the purpose of one of the studies was to assess coach's trustworthiness, they may have altered their answers in the questionnaire to suit the assumed hypothesis. To combat this limitation, participants were always kept in the dark about the specific research question and hypothesis. Nonetheless, it is still possible that participants formed their own hypothesis and attempted to answer a specific way.

Due to the methodology chosen and the strong emphasis on data collection through questionnaires the current thesis focused on the perception of trustworthiness and not on actual trust or trusting behaviors. As discussed previously in the theoretical background, it is important to make a distinction between trust and trustworthiness. The current research focused on the subjective perception of trustworthiness. In which way these perceptions translate into actual trusting behaviors was not examined. The outcomes specified in the model relate to outcomes of actual trust in coach. Thus, one limitation of the current research is that it cannot infer from the perception of trustworthiness to actual impacts on relationship outcomes or actual trusting

behaviors. In order to examine these outcomes, different methodological approaches must be chosen, assessing actual behaviors.

Finally, some theoretical and conceptual limitations must be considered: The current thesis focused on coach-athlete communication, almost exclusively regarding objective training data and information about current performance parameters within the context of positive relationships. Therefore, the results are applicable to this context. The research conducted throughout this thesis allows no conclusions to be drawn about the impact of digital communication within damaged relationships, for trust repair or conflict resolution communication. Repairing damaged trust is more complex than building initial trust or maintaining existing trust (e.g. Gillespie & Dietz, 2009; Lewicki & Bunker, 1996). Furthermore, communication to resolve conflicts is more complex than communicating objective training data and parameters. The current research focused exclusively on these relatively "easy" forms of communication, focusing on indisputable content. When coach and athlete need to resolve differences of opinion through digital communication, the results may well be different. Future research should thus address these forms of communication, in order to gain insight about the applicability of the proposed model for other types of communication.

11. Conclusion

The coach-athlete relationship is one of the most important relationships in an athlete's life. Communication between both relationship partners is essential, for the relationship in general, and trust in particular to develop. Many prominent examples of coach-athlete dyads come to mind looking at the development of athletic careers. Athletes talk about how important their coach was to them, and how important it is to have someone to talk to and someone to trust. However, the ways athletes and coaches interact are changing, as the process of digitization takes hold. Athletes like the triathlete Jan Frodeno can receive expert coaching and live-feedback from coach, regardless of where he is training or where his coach currently is.

Digitization as a process has affected this part of the sporting realm, just as it has affected many other areas of everyday life. The fast and easy dissemination of information offers opportunities for communication and connection across great distances, and technological advances in tracking and monitoring applications offer many benefits when implemented in the coach-athlete relationship. As more athletes and coaches have access to expert knowledge, coaches and athletes can connect and effectively train with each other. While these benefits are already being reaped, research has thus far focused very little on possible detrimental effects of digital communication on the development of trust. The current thesis was the first to address this gap in the research. The thesis addressed this gap, by first developing a model of trust through digital communication within the relationship. Thus, the model offers a contribution both to trust and coach-athlete relationship research, by firmly and theoretically grounding the research. The proposed model can be implemented both by future researchers to develop testable hypothesis, and by practitioners working with coach-athlete dyads.

Overall, the results of the three separate studies indicate that within existing relationships, objective training data and information can be communicated through digital channels without fear of detrimental effects, especially when the technology is trustworthy. Especially in new relationships, special care in the communication must be taken for the antecedent of benevolence. The research further indicates that trust in digital training technologies can be measured through the technology specific antecedents of functionality, reliability and help-function. When a technology has proper functions, works reliably and offers adequate help through a special function, athletes perceive it to be trustworthy and are thus more likely to use it. However, if the technology is perceived as untrustworthy, the current research indicates that this will have a negative effect of on the trustworthiness of the coach. Therefore, it will be important for coaches, when implementing new technologies, to ensure their trustworthiness. These results appear to be especially applicable within a sport and exercise context.

12. References

Adie, J. W., Duda, J. L., & Ntoumanis, N. (2008). Autonomy support, basic need satisfaction and the optimal functioning of adult male and female sport participants: A test of basic needs theory. *Motivation and Emotion*, *32*(3), 189-199

Aljukhadar, M., Senecal, S., & Ouellette, D. (2010). Can the media richness of a privacy disclosure enhance outcome? A multifaceted view of trust in rich media environments. *International Journal of Electronic Commerce*, *14*(4), 103-126. doi:10.2753/JEC1086-4415140404

Allan, V., & Côté, J. (2016). A cross-dectional analysis of coaches' observed emotion-behavior profiles and adolescent athletes' self-reported developmental outcomes. *Journal of Applied Sport Psychology, 28*(3), 321-337. doi:10.1080/10413200.2016.1162220

Amorose, A. J., & Anderson-Butcher, D. (2007). Autonomy-supportive coaching and self-determined motivation in high school and college athletes: A test of self-determination theory. *Psychology of Sport and Exercise*, *8*(5), 654-670. doi:10.1016/j.psychsport.2006.11.003

Baker, J., Côté, J., & Hawes, R. (2000). The relationship between coaching behaviors and sport anxiety in athletes. *Journal of Science and Medicine in Sport, 3*(2), 110-119. doi: 10.1016/S1440-2440(00)80073-0

Balaguer, I., González, L., Fabra, P., Castillo, I., Mercé, J., & Duda, J. L. (2012). Coaches' interpersonal style, basic psychological needs and the well-and ill-being of young soccer players: A longitudinal analysis. *Journal of Sports Sciences*, *30*(15), 1619-1629. doi:10.1080/02640414.2012.731517

Ball, R. (2014). *Die pausenlose Gesellschaft: Fluch und Segen der digitalen Permanenz*. Stuttgart: Schattauer Verlag

Banack, H. R., Sabiston, C. M., & Bloom, G. A. (2011). Coach autonomy support, basic need satisfaction, and intrinsic motivation of paralympic athletes. *Research Quarterly for Exercise and Sport*, *82*(4), 722-730. doi:10.1080/02701367.2011.10599809

Barnett, N. P., Smoll, F. L., & Smith, R. E. (1992). Effects of enhancing coach-athlete relationships on youth sport attrition. *The Sport Psychologist*, *6*, 111-127.

Barrera, D., & Buskens, V. (2007). Imitation and learning under uncertainty: a vignette experiment. *International Sociology*, *22*(3), 367-396. doi:10.1177/0268580907076576

Barrera, D., Buskens, V., & Raub, W. (2012). Embedded trust: The analytical approach in vignettes, laboratory experiments and surveys. In F. Lyon, G. Möllering & M. N. K. Saunders (Eds.), *Handbook of Research Methods on Trust* (pp. 199-211). Cheltenham: Edward Elgar Publishing Limited

Beldad, A., De Jong, M., & Steehouder, M. (2010). How shall I trust the faceless and the intangible? A literature review on the antecedents of online trust. *Computers in Human Behavior, 26*(5), 857-869. doi: 10.1016/j.chb.2010.03.013

Benbasat, I., Gefen, D., & Pavlou, P. A. (2010). Introduction to the special issue on novel perspectives on trust in information systems. *Mis Quarterly*, *34*(2), 367-371

Bennie, A., & O'Connor, D. (2012). Coach-athlete relationships: A qualitative study of professional sport teams in Australia. *International Journal of Sport andHhealth Science*, 10, 58-64

Bentele, G. (1988). Der Faktor Glaubwürdigkeit : Forschungsergebnisse und Fragen für die Sozialisationsperspektive. *Publizistik, 33*(2-3), 406-426

Bergmann Drewe, S. (2002). The Coach-Athlete Relationship: How Close Is Too Close?. *Journal of the Philosophy of Sport, 29*, 174-181. doi.10.1080/00948705.2002.9714633

Biocca, F., Harms, C., & Burgoon, J. K. (2003). Toward a more robust theory and measure of social presence: Review and suggested criteria. *Presence: Teleoperators & Virtual Environments*, *12*(5), 456-480

Borggrefe, C. & Cachay, K. (2015). *Kommunikation als Herausforderung – Eine theoretisch-empirische Studie zur Trainer-Athlet-Kommunikation im Spitzensport*. (1st ed.). Schorndorf: Hofmann-Verlag

Breuer, C., Hüffmeier, J., & Hertel, G. (2016). Does trust matter more in virtual teams? A meta-analysis of trust and team effectiveness considering virtuality and documentation as moderators. *Journal of Applied Psychology*, *101*(8), 1151-1177

Brooks, D. D., Ziatz, D., Johnson, B., & Hollander, D. (2000). Leadership behavior and job responsibilities of NCAA Division 1A strength and conditioning coaches. *The Journal of Strength & Conditioning Research*, *14*(4), 483-492

Brunelle, E., & Lapierre, J. (2008). *Testing media richness theory to explain consumers' intentions of buying online*. Paper presented at Proceedings of the 10th International Conference on Electronic Commerce, Innsbruck, Austria. doi:10.1145/1409540.1409582

Burgoon, J. K., Bonito, J. A., Ramirez Jr, A., Dunbar, N. E., Kam, K., & Fischer, J. (2002). Testing the interactivity principle: Effects of mediation, propinquity, and verbal and nonverbal modalities in interpersonal interaction. *Journal of Communication*, *52*(3), 657-677. doi: 10.1111/j.1460-2466.2002.tb02567.x

Burke, M. (2001). Obeying until it hurts: Coach-athlete relationships. *Journal of the Philosophy of Sport, 28*, 227-240. doi:10.1080/00948705.2001.9714616

Burke, K., Aytes, K., Chidambaram, L., & Johnson, J. J. (1999). A study of partially distributed work groups: The impact of media, location, and time on perceptions and performance. *Small Group Research*, *30*(4), 453-490. doi:10.1177/104649649903000404

Bussmann, G., (1997). Wie verhindern wir dropputs? *Leistungssport, 6*(27), 49-51

Calefato, F., Lanubile, F., & Novielli, N. (2014). Investigating the Effect of Social Media on Trust Building in Customer-supplier Relationships. In S. Hammoudi, L. Maciaszek, & J. Cordeiro. *ICEIS 2014* Paper presented at Proceedings of the 16th International Conference on Enterprise Information Systems, Lissabon, Portugal (pp. 635-642). Portugal, Science and Technology Publications, Lda

Camerer, C. F. (2003). Strategizing in the brain. *Science*, *300*(5626), 1673-1675. doi:10.1126/science.1086215

Canavari, M., Fritz, M., Hofstede, G. J., Matopoulos, A., & Vlachopoulou, M. (2010). The role of trust in the transition from traditional to electronic B2B relationships in agri-food chains. *Computers and Electronics in Agriculture*, *70*(2), 321-327. doi:10.1016/j.compag.2009.08.014

Carleton, E. L., Barling, J., Christie, A. M., Trivisonno, M., Tulloch, K., & Beauchamp, M. R. (2016). Scarred for the rest of my career? Career-long effects of abusive leadership on professional athlete aggression and task performance. *Journal of Sport and Exercise Psychology*, *38*(4), 409-422. doi:10.1123/jsep.2015-0333

Cassidy, T. G., Jones, R. L., & Potrac, P. (2008). *Understanding sports coaching: The social, cultural and pedagogical foundations of coaching practice*. (2nd Edition). London: Routledge.

Chandler, D., & Munday, R. (2011). *A dictionary of media and communication*. Oxford: Oxford University Press.

Chao, R. M., Chang, C. C., & Chang, W. Y. (2014). Exploring the antecedents of trust from the perspectives of uncertainty and media richness in virtual community. *International Journal of Web Based Communities*, *10*(2), 176-187. doi:10.1504/IJWBC.2014.060354

Chelladurai, P. (1980). Leadership in sports organizations. *Canadian Journal of Applied Sport Sciences. Journal Canadien des Sciences Appliquees au Sport*, *5*(4), 226-231

Chelladurai, P. (1990). Leadership in sports: A review. *International Journal of Sport Psychology*. *21*(4), 328-354.

Chelladurai, P. (1993). Leadership. In R. N. Singer, M. Murphey, & L. K. Tennant (Eds.), *Handbook of Research on Sport Psychology* (pp.. 647-671). New York: Macmillian

Chelladurai, P., & Saleh, S. D. (1980). Dimensions of leader behavior in sports: Development of a leadership scale. *Journal of Sport Psychology*, *2*(1), 34-45. doi:10.1123/jsp.2.1.34

Corritore, C. L., Kracher, B., & Wiedenbeck, S. (2003). On-line trust: concepts, evolving themes, a model. *International Journal of Human-Computer Studies*, *58*(6), 737-758. doi:10.1016/S1071-5819(03)00041-7

Côté, J., & Gilbert, W. (2009). An integrative definition of coaching effectiveness and expertise. *International Journal of Sports Science & Coaching*, *4*, 307-323. doi:10.1260/174795409789623892

Cumming, S. P., Smith, R. E., & Smoll, F. L. (2006). Athlete-perceived coaching behaviors: Relating two measurement traditions. *Journal of Sport and Exercise Psychology*, *28*(2), 205-213. doi:10.1123/jsep.28.2.205

Cummings, L. L., & Bromiley, P. (1996). The Organizational Trust Inventory (OTI): Development and Validation. . In R. M. Kramer & T. R. Tyler (Eds.), *Trust in Organizations: Frontiers of Theory and Tesearch* (pp. 261-287). Thousand Oaks, CA: SAGE Publications, Inc.

Curtis, B., Smith, R. E., & Smoll, F. L. (1979). Scrutinizing the Skipper: A study of leadership behaviors in the dugout. *Journal of Applied Psychology*, *64*, 391. doi:10.1037/0021-9010.64.4.391

Daft, R. L., & Lengel, R. H. (1986). Organizational information requirements, media richness and structural design. *Management Science*, *32*(5), 554-571. doi:10.1287/mnsc.32.5.554

Daley, C., & Wolfson, S. (2010). Leadership at distance: English football fans' trust in Sven Goran Eriksson and David Beckham during the 2006 World Cup. *Sport & Exercise Psychology Review*, *6*(1), 3-18

Das, T. K., & Teng, B. S. (2004). The risk-based view of trust: A conceptual framework. *Journal of Business and Psychology*, *19*(1), 85-116.

De Meyer, A. (1991). Tech talk: How managers are stimulating global R&D communication. *MIT Sloan Management Review*, *32*(3), 49

Dennis, A. R., & Kinney, S. T. (1998). Testing media richness theory in the new media: The effects of cues, feedback, and task equivocality. *Information Systems Research*, *9*(3), 256-274. doi:10.1287/isre.9.3.256

DeRosa, D. M., Hantula, D. A., Kock, N., & D'Arcy, J. (2004). Trust and leadership in virtual teamwork: A media naturalness perspective. *Human Resource Managemen*, *43*(2-3), 219-232. doi:10.1002/hrm.20016

Deutsch, M. (1958). Trust and suspicion. *Journal of Conflict Resolution*, *2*(4), 265-279. doi:10.1177/002200275800200401

Deutsch, M. (1960). The effect of motivational orientation upon trust and suspicion. *Human Relations*, *13*(2), 123-139. doi:10.1177/001872676001300202

Dietz, G., & Den Hartog, D. N. (2006). Measuring trust inside organisations. *Personnel Review*, *35*(5), 557-588. doi:10.1080/21515581.2011.552424

Dirks, K. T. (2000). Trust in leadership and team performance: Evidence from NCAA basketball. *Journal of Applied Psychology*, *85*, 1004-1012. doi:10.1037//0021-90I0.85.6.1004

Dreiskämper, D. (2014). *Die Vertrauenswürdigkeit der Anti-Doping Arbeit von Sportverbänden* Doctoral Dissertation, Department of Sport Psychology University of Münster, Münster

Dreiskämper, D., Pöppel, K., Strauß, B. (2016). Vertrauen ist gut... Entwicklung und Validierung eines Inventars zur Messung von Vertrauenswürdigkeit im Sport. *Zeitschrift für Sportpsychologie*, *23*(1), 1-12.

Dreiskaemper, D., Pöppel, K, Petróczi, A., Folkerts, D., & Strauss, B. (in prep.). Trust, but verify? Validation of a short scale for perceived trustworthiness in sport (SSPT). *Manuscript in preparation*

Elbe, A. M. (2004). Testgütekriterien der deutschen Version des Sport Orientation Questionnaires. *Spectrum*, *16*(1), 96-107.

Elefant, C. (2011). The power of social media: legal issues & best practices for utilities engaging social media. *Energy Law Journal*, *32*(1), 1-56

Fraser-Thomas, J. L., Côté, J., & Deakin, J. (2005). Youth sport programs: An avenue to foster positive youth development. *Physical Education & Sport Pedagogy, 10*, 19-40. doi:10.1080/1740898042000334890

Fraser-Thomas, J., Côté, J., & Deakin, J. (2008). Examining adolescent sport dropout and prolonged engagement from a developmental perspective. *Journal of Applied Sport Psychology*, *20*, 318-333. doi: 10.1080/10413200802163549

Friedman, B., Khan Jr, P. H., & Howe, D. C. (2000). Trust online. *Communications of the ACM*, *43*(12), 34-40. doi:10.1145/355112.355120

Gagne, M., Ryan R., & Bargmann, K. (2003). Autonomy support and need satisfaction in the motivation and well-being of gymnasts. *Journal of Applied Sport Psychology, 15*, 372-390. doi:10.1080/714044203

Gefen, D., & Straub, D. W. (2004). Consumer trust in B2C e-Commerce and the importance of social presence: experiments in e-Products and e-Services. *Omega*, *32*(6), 407-424. doi:10.1016/j.omega.2004.01.006

Gefen, D., Benbasat, I., & Pavlou, P. (2008). A research agenda for trust in online environments. *Journal of Management Information Systems*, *24*(4), 275-286. doi:10.2753/MIS0742-1222240411

Gefen, D., Karahanna, E., & Straub, D. W. (2003). Trust and TAM in online shopping: An integrated model. *MIS Quarterly*, *27*(1), 51-90.

Gremler, D. D. (2004). The critical incident technique in service research. *Journal of Service Research, 7*(1), 65-89.

Giffin, K. (1967). The contribution of studies of source credibility to a theory of interpersonal trust in the communication department. *Psychological Bulletin, 68,* 104-120.

Gilbert, C. (2012). *'Basketball Is a Dance' – Dirk Nowitzki and the Man Who Discovered Him.* Retrieved from http://www.spiegel.de/international/world/an-interview-with-dirk-nowitzki-and-his-mentor-holger-geschwindner-a-860109.html, last accessed 27.07.2018

Gillespie, N., & Dietz, G. (2009). Trust repair after an organization-level failure. *Academy of Management Review*, *34*(1), 127-145. doi:10.5465/amr.2009.35713319

González, L., García-Merita, M., Castillo, I., & Balaguer, I. (2016). Young athletes' perceptions of coach behaviors and their implications on their well-and ill-being over time. *The Journal of Strength & Conditioning Research*, *30*(4), 1147-1154. doi:10.1519/JSC.0000000000001170

Gould, D., & Pick, S. (1995). Sport psychology: The Griffith era, 1920–1940. *The Sport Psychologist, 9*, 391-405.

Gould, D., Guinan, D., Greenleaf, C., Medbery, R., & Peterson, K. (1999). Factors affecting Olympic performance: Perceptions of athletes and coaches from more and less successful teams. *The Sport Psychologist, 13*, 371-394.

Graham, J. M. (2006). Congeneric and (essentially) tau-equivalent estimates of score reliability: What they are and how to use them. *Educational and Psychological Measurement*, *66*(6), 930-944.

Greenhow, C. (2011). Online social networks and learning. *On the Horizon*, *19*(1), 4-12.

Gremler, D. D. (2004). The critical incident technique in service research. *Journal of Service Research*, *7*(1), 65-89. doi:10.1177/1094670504266138

Griffith, C. R. (1926). *Psychology of Coaching*. New York: Scribner's.

Guo, S. L., Lumineau, F., & Lewicki, R. J. (2017). Revisiting the foundations of organizational distrust. *Foundations and Trends in Management*, *1*(1), 1-88. doi:10.1561/3400000001

Håkonsson, D. D., Obel, B., Eskildsen, J. K., & Burton, R. M. (2016). On cooperative behavior in distributed teams: the influence of organizational design, media richness, social interaction, and interaction adaptation. *Frontiers in Psychology*, *7*, 692. doi:10.3389/fpsyg.2016.00692

Hamidian, K., & Kraijo, C. (2013). DigITalisierung–Status quo. In F. Keuper, K. Hamidian, E. Verwaayen, T. Kalinowski, C. Kraijo, (Eds). *Digitalisierung und Innovation* (pp. 1-23). Springer Gabler, Wiesbaden.

Handy, C. (1995). Trust and the virtual organization. *Harvard Business Review, 73*(3), 40-50

Hartmann, M. (2011). *Die Praxis des Vertrauens*. Suhrkamp Verlag.

Hess, T. (2016): Digitalisierung. In: N. Gronau, J. Becker, E. J. Sinz, L. Suhl, Leena, J. M. Leimeister, (Eds.). *Enzyklopädie der Wirtschaftsinformatik. Online-Lexikon*. München: Oldenbourg. Zugriff am 14.12.2017

Hinds, P. J., & Mortensen, M. (2005). Understanding conflict in geographically distributed teams: The moderating effects of shared identity, shared context, and spontaneous communication. *Organization Science*, *16*(3), 290-307. doi:10.1287/orsc.1050.0122

Holt, N. L., & Hogg, J. M. (2002). Perceptions of stress and coping during preparations for the 1999 women's soccer world cup finals. *The Sport Psychologist, 16*, 251-271.

Holtgrewe, U. (2014). New new technologies: the future and the present of work in information and communication technology. *New Technology, Work and Employment*, *29*(1), 9-24. doi:10.1111/ntwe.12025

Horn, T. S., Bloom, P., Berglund, K. M., & Packard, S. (2011). Relationship between collegiate athletes' psychological characteristics and their preferences for different types of coaching behavior. *The Sport Psychologist*, *25*(2), 190-211. doi:10.1123/tsp.25.2.190

Horne, T., & Carron, A. V. (1985). Compatibility in coach-athlete relationships. *Journal of Sport Psychology*, *7*(2), 137-149.

Hovland, C. I., Janis, I. L., & Kelley, H. H. (1953). *Communication and persuasion; psychological studies of opinion change*. New Haven, CT, US: Yale University Press. doi:10.1123/jsp.7.2.137

Hu, L. T., & Bentler, P. M. (1999). Cutoff criteria for fit indexes in covariance structure analysis: Conventional criteria versus new alternatives. *Structural Equation Modeling: A Multidisciplinary Journal*, *6*(1), 1-55. doi:10.1080/10705519909540118

International Federation of Sport Climbing [IFSC]. (2015, 06.16.). *Shauna Coxsey Talks Climbing & Training.* Retrieved from https://www.youtube.com/watch?v=nMXwojYLnkA

Jackson, B., Dimmock, J. A., Gucciardi, D. F., & Grove, J. R. (2011). Personality traits and relationship perceptions in coach–athlete dyads: Do opposites really attract?. *Psychology of Sport and Exercise*, *12*(3), 222-230. doi:10.1016/j.psychsport.2010.11.005

Janson, A., Hoffmann, A., Hoffmann, H., Leimeister, J. M. (2013). How Customers Trust Mobile Marketing Applications. In R. Baskerville & M. Chau. *ICIS 2013 Proceedings*. Paper published at Proceedings of the International Conference on Information Systems: Reshaping Society through Information Systems Design. Milan, Italy *(pp1-21)*. Atlanta, Ga: AISeL

Jarvenpaa, S. L., & Leidner, D. E. (1999). Communication and trust in global virtual teams. *Organization Science*, *10*(6), 791-815. doi: 10.1287/orsc.10.6.791

Jarvenpaa, S. L., Cantu, C., & Lim, S. Y. (2017). Trust in virtual online environments. In G. Hertel, D. L. Stone, R. D. Johnson, & J. Passmore (Eds.) *The Wiley Blackwell Handbook of the Psychology of the Internet at Work* (pp. 103-130), Wiley-Blackwell doi: 10.1002/9781119256151.ch6

Jarvenpaa, S. L., Knoll, K., & Leidner, D. E. (1998). Is anybody out there? Antecedents of trust in global virtual teams. *Journal of Management Information Systems*, *14*(4), 29-64. doi:10.1080/07421222.1998.11518185

Jarvenpaa, S. L., Tractinsky, N., & Vitale, M. (2000). Consumer trust in an Internet store. *Information Technology and Management*, *1*(1-2), 45-71.

Jensen, C., Farnham, S. D., Drucker, S. M., & Kollock, P. (2000). The effect of communication modality on cooperation in online environments. Paper presented at *Proceedings of the SIGCHI conference on Human Factors in Computing Systems* (pp. 470-477). Boston, MA, ACM. doi: 10.1145/332040.332478

Johnson, A.J. (2016). *Jan Frodeno's Preparation for the 2016 IRONMAN World Championships.* Retrieved from https://www.trainingpeaks.com/blog/jan-frodeno-s-preparation-for-the-2016-ironman-world-championships/

Jowett, S. (2005). The coach-athlete partnership. *The Psychologist*, *18*(7), 412-415.

Jowett, S. (2007). Interdependence Analysis and the 3+1Cs in the Coach – Athlete Relationship. In S. Jowette, D. Lavallee, S. (Edt.*) Social Psychology in Sport*. 15-27, Champaign, IL, US, Human Kinetics.

Jowett, S. (2009). Factor structure and criterion-related validity of the metaperspective version of the Coach–Athlete Relationship Questionnaire (CART-Q). *Group Dynamics: Theory, Research, and Practice*, *13*(3), 163-177.

Jowett, S. & Clark-Carter, D. (2006). Perceptions of empathic accuracy and assumed similarity in the coach–athlete relationship. *British Journal of Social Psychology*, *45*(3), 617-637. doi:10.1348/014466605X58609

Jowett, S., & Cockerill, I. (2002). Incompatibility in the coach-athlete relationship. In I. Cockerill (Edt.) *Solutions in Sport Psychology*. 16-31, London, Thomson Learning.

Jowett, S., & Cockerill, I. (2003). Olympic medalists' perspective of the athelte-coach relationship. *Psychology of Sport and Exercise*, 4, 313-331. doi:10.1016/S1469-0292(02)00011-0

Jowett, S., & Meek, G. A. (2000). The coach-athlete relationship in married couples: An exploratory content analysis. *The Sport Psychologist*, *14*(2), 157-175. doi:10.1123/tsp.14.2.157

Jowett, S., & Nezlek, J. (2011). Relationship interdependence and satisfaction with important outcomes in coach–athlete dyads. *Journal of Social and Personal Relationships*, *29*(3), 287-301. doi:10.1177/0265407511420980

Jowett, S., & Ntoumanis, N. (2004). The coach–athlete relationship questionnaire (CART-Q): Development and initial validation. *Scandinavian Journal of Medicine & Science in Sports*, *14*(4), 245-257. doi:10.1111/j.1600-0838.2003.00338.x

Jowett, S., & Poczwardowski, A. (2007). Understanding the coach-athlete relationship. In S. Jowette & D. Lavallee (Eds.), *Social Psychology in Sport* (pp. 3-14). Champaign, IL, US: Human Kinetics.

Kanawattanachai, P., & Yoo, Y. (2002). Dynamic nature of trust in virtual teams. *The Journal of Strategic Information Systems*, *11*(3-4), 187-213. doi:10.1016/S0963-8687(02)00019-7

Kaplan, A. M., & Haenlein, M. (2010). Users of the world, unite! The challenges and opportunities of Social Media. *Business Horizons*, *53*(1), 59-68.

Kee, H. W., & Knox, R. E. (1970). Conceptual and methodological considerations in the study of trust and suspicion. *Journal of Conflict Resolution*, *14*(3), 357-366. doi:10.1177/002200277001400307

Kelley, H., Bersheid, E., Christensen, A., Harvey, H. H., Huston, T. L., Levinger, G., McClintock, E., Peplau, L. A., & Peterson, D., R. (1983). *Close Relationships.* New York: W. H. Freeman.

Kohring, M. (2002). Vertrauen in Journalismus. In: A. Scholl, (Ed.): S*ystemtheorie und Konstruktivismus in der Kommunikationswissenschaft* (pp. 91-110). Konstanz: UVK Verlagsgesellschaft.

Komiak, S. Y., & Benbasat, I. (2006). The effects of personalization and familiarity on trust and adoption of recommendation agents. *MIS Quarterly*, 941-960.

Krotz, F. (2012): Von der Entdeckung der Zentralperspektive zur Augmented Reality: Wie Mediatisierung funktioniert. In: F. Krotz & A.Hepp (Eds.): *Mediatisierte Welten. Forschungsfelder und Beschreibungsansätze* (pp. 27-55). Wiesbaden: VS Verlag.

Koufaris, M., & Hampton-Sosa, W. (2004). The development of initial trust in an online company by new customers. *Information & Management*, *41*(3), 377-397. doi:10.1016/j.im.2003.08.004

Lackes, R. & Siepermann, M. (2016). Web2.0 In N. Gronau, J. Becker, E. J. Sinz, L. Suhl, Leena, J. M. Leimeister, (Eds.). *Enzyklopädie der Wirtschaftsinformatik. Online-Lexikon*. München: Oldenbourg. Zugriff am 14.12.2017

Lafrenière, M. A. K., Jowett, S., Vallerand, R. J., & Carbonneau, N. (2011). Passion for coaching and the quality of the coach–athlete relationship: The mediating role of

coaching behaviors. *Psychology of Sport and Exercise, 12*, 144-152. doi:10.1016/j.psychsport.2010.08.002

Lankton, N. K., & McKnight, D. H. (2011). What does it mean to trust Facebook?: Examining technology and interpersonal trust beliefs. *ACM SIGMIS Database: The Database for Advances in Information Systems*, *42*(2), 32-54.

Larzelere, R. E., & Huston, T. L. (1980). The dyadic trust scale: Toward understanding interpersonal trust in close relationships. *Journal of Marriage and the Family*, 595-604. doi:10.1145/1989098.1989101

LaVoi, N. M. (2004). *Dimensions of closeness and conflict in the coach-athlete relationship.* Paper presented at the 19th Annual Conference of the Association for the Advancement of Applied Sport Psychology, *Minneapolis, MN.*

LaVoi, N. M. (2007). Interpersonal communication and conflict in the coach-athlete relationship. In S. Jowette, D. Lavallee, S. (Eds.*) Social Psychology in Sport*. 29-40, Champaign, IL, US, Human Kinetics.

Lee, J., & Moray, N. (1992). Trust, control strategies and allocation of function in human-machine systems. *Ergonomics*, *35*(10), 1243-1270. doi:10.1080/00140139208967392

Lee, J. D., & See, K. A. (2004). Trust in automation: Designing for appropriate reliance. *Human Factors*, *46*(1), 50-80.doi 10.1518/hfes.46.1.50_30392

Lee, J., Kim, H. J., & Ahn, M. J. (2011). The willingness of e-Government service adoption by business users: The role of offline service quality and trust in technology. *Government Information Quarterly*, *28*(2), 222-230. doi:10.1016/j.giq.2010.07.007

Lewis, J. D., & Weigert, A. (1985). Trust as a social reality. *Social Forces*, *63*(4), 967-985. doi:10.1093/sf/63.4.967

Lewicki, R. J. (2006). Trust, trust development, and trust repair. In M. Deutsch, P. T. Coleman & E. C. Marcus (Eds.), *The Handbook of Conflict Resolution* (pp. 92-119). San Francisco: Jossey-Bass

Lewicki, R. J., & Brinsfield, C. (2012). Measuring trust beliefs and behavior. In F. Lyon, G. Möllering & M. Saunders (Eds.), *Handbook of Research Methods on Trust* (pp. 29-39). Cheltenham, UK: Edward Elgar Publishing Limited

Lewicki, R. J., & Bunker, B. B. (1995). Trust in relationships: A model of development and decline. In B. B. Bunker & J. Z. Rubin (Eds.), *Conflict, cooperation and justice: Essays inspired by the work of Morton Deutsch*. San Francisco: Jossey-Bass.

Lewicki, R. J., & Bunker, B. B. (1996). Developing and maintaining trust in work relationships. In R. M. Kramer & T. R. Tyler (Eds.), *Trust in Organizations - Frontiers of theory and research* (pp. 114-139). Thousand Oaks, California: Sage

Lewicki, R.J. & Wiethoff, C. (2000). Trust, Trust Development, and Trust Repair. In. M. Deutsch & P.T. Coleman (Eds.*), The handbook of conflict resolution: Theory and practice* (p. 86-107). San Francisco, CA: Jossey-Bass.

Lewicki, R. J., Tomlinson, E. C., & Gillespie, N. (2006). Models of Interpersonal Trust Development: Theoretical Approaches, Empirical Evidence, and Future Directions. *Journal of Management, 32*(6), 991-1022. doi: 10.1177/0149206306294405

Li, F., Pieńkowski, D., van Moorsel, A., & Smith, C. (2012). A holistic framework for trust in online transactions. *International Journal of Management Reviews*, *14*(1), 85-103. doi:10.1111/j.1468-2370.2011.00311.x

Lieberman, J. K. (1981). *The litigious society*. New York: Basic Books.

Lowry, P. B., Roberts, T. L., Romano Jr, N. C., Cheney, P. D., & Hightower, R. T. (2006). The impact of group size and social presence on small-group communication: Does computer-mediated communication make a difference?. *Small Group Research*, *37*(6), 631-661. doi:10.1177/1046496406294322

Lowry, P. B., Vance, A., Moody, G., Beckman, B., & Read, A. (2008). Explaining and predicting the impact of branding alliances and web site quality on initial consumer trust of e-commerce web sites. *Journal of Management Information Systems*, *24*(4), 199-224. doi:10.2753/MIS0742-1222240408

Luhmann, N. (1979). *Trust and power.* Chichester, UK: John Wiley

Lundby, K. (2009). *Mediatization: concept, changes, consequences*. New York: Peter Lang.

Lyon, F. (2012). Access and non-probability sampling in qualitative research on trust. In F. Lyon, G. Möllering & M. N. K. Saunders (Eds.), *Handbook of research methods on trust* (pp. 85-94). Cheltenham: Edward Elgar Publishing Limited.

Lyon, F., Möllering, G., & Saunders, M. N. (2012). Introduction: the variety of methods for the muti-faceted phenomenon of trust. In F. Lyon, G. Möllering & M. N. K. Saunders (Eds*.), Handbook of research methods on trust* (pp. 1-15). Cheltenham: Edward Elgar Publishing Limited.

Mageau, G. A., & Vallerand, R. J. (2003). The coach–athlete relationship: A motivational model. *Journal of Sports Science*, *21*, 883-904. doi:10.1080/0264041031000140374

Mallett, C. J. (2005). Self-determination theory: A case study of evidence-based coaching. *The Sport Psychologist*, *19*(4), 417-429.

Mayer, R. C., & Davis, J. H. (1999). The effect of the performance appraisal system on trust for management: A field quasi-experiment. *Journal of Applied Psychology*, *84*(1), 123. doi:10.5465/amr.1995.9508080335

Mayer, R. C., & Norman, P. M. (2004). Exploring attributes of trustworthiness: A classroom exercise. *Journal of Management Education*, *28*(2), 224-249. doi:10.1177/1052562903252641

Mayer, R. C., Davis, J. H., & Schoorman, F. D. (1995). An integrative model of organizational trust. *Academy of management review*, *20*(3), 709-734. doi:10.5465/amr.1995.9508080335

Maznevski, M. L., & Chudoba, K. M. (2000). Bridging space over time: Global virtual team dynamics and effectiveness. *Organization Science*, *11*(5), 473-492. doi:10.1287/orsc.11.5.473.15200

McAllister, D. J. (1995). Affect-and cognition-based trust as foundations for interpersonal cooperation in organizations. *Academy of Management Journal*, *38*(1), 24-59. doi:10.5465/256727

McAllister, D. J., Lewicki, R. J., & Chaturvedi, S. (2006). Trust in developing relationships: From theory to measurement. Academy of Management Proceedings, 2006(1), G1-G6. doi: 10.5465/ambpp.2006.22897235.

McDonald, R. P. (1985). *Factor analysis and related methods.* New York: Psychology Press

McDonald, R. P. (1999). *Test theory: A unified treatment.* New York: Psychology Press.

McEvily, B., & Tortoriello, M. (2011). Measuring trust in organisational research: Review and recommendations. *Journal of Trust Research*, *1*(1), 23-63. doi:10.1080/21515581.2011.552424

McFarland, L. A., & Ployhart, R. E. (2015). Social media: A contextual framework to guide research and practice. *Journal of Applied Psychology*, *100*(6), 1653.

McKnight, D. H. (2005). Trust in information technology. In G. B. Davis, (Ed.) *The Blackwell Encyclopedia of management*, (pp.)329-331. Malden: Blackwell

McKnight, D. H., & Chervany, N. L. (2001). Trust and distrust definitions: One bite at a time. In R. Falcone, Singh, Y.-H. Tan (Eds.). *Trust in Cyber-societies* (pp. 27-54). Berlin: Springer.

McKnight, D. H., Choudhury, V., & Kacmar, C. (2002a). Developing and validating trust measures for e-commerce: An integrative typology. *Information systems research*, *13*(3), 334-359.

McKnight, D. H., Choudhury, V., & Kacmar, C. (2002b). The impact of initial consumer trust on intentions to transact with a web site: a trust building model. *The Journal of Strategic Information Systems*, *11*(3-4), 297-323. doi:10.1016/S0963-8687(02)00020-3

McKnight, D. H., Cummings, L. L., & Chervany, N. L. (1998). Initial trust formation in new organizational relationships. *Academy of Management Review*, *23*(3), 473-490. doi:10.5465/amr.1998.926622

McKnight, D. H., Carter, M., Thatcher, J. B., & Clay, P. F. (2011). Trust in a specific technology: An investigation of its components and measures. *ACM Transactions on Management Information Systems*, *2*(2), 12. doi:10.1145/1985347.1985353

Meinberg, E. (2010). Vertrauen im Sport. In M. Schweer (Ed.), *Vertrauensforschung 2010: A State of the Art* (pp. 191-206). Frankfurt am Main: Peter Lang

Merz, F. & Thiel, A. (2014). Kommunikation zwischen Trainer und Athlet: Studie zu Einzelgesprächen im Spitzensport. *Leistungssport, 44* (1), 39-44.

Metzger, M. J., & Flanagin, A. J. (2013). Credibility and trust of information in online environments: The use of cognitive heuristics. *Journal of Pragmatics*, *59*, 210-220. doi 10.1016/j.pragma.2013.07.012

Meyerson, D., Weick, K. E., & Kramer, R. M. (1996). Swift trust and temporary groups. In R. M. Kramer & T. R. Tyler (Eds.), *Trust in Organizations - Frontiers of theory and research* (pp. 166-195). Thousand Oaks, California: Sage

Montgomery, B. M., & Baxter, L. A. (1998). Dialogism and relational dialectics. *Dialectical Approaches to Studying Personal Relationships*, 155-183.

Mouzas, S., Henneberg, S., & Naudé, P. (2007). Trust and reliance in business relationships. *European Journal of Marketing*, *41*(9/10), 1016-1032. doi:10.1108/03090560710773327

Muir, B. M. (1987). Trust between humans and machines, and the design of decision aids. *International Journal of Man-Machine Studies*, *27*(5-6), 527-539. doi:10.1016/S0020-7373(87)80013-5

Muir, B. M. (1994). Trust in automation: Part I. Theoretical issues in the study of trust and human intervention in automated systems. *Ergonomics*, *37*(11), 1905-1922. doi:10.1080/00140139408964957

Muir, B. M., & Moray, N. (1996). Trust in automation. Part II. Experimental studies of trust and human intervention in a process control simulation. *Ergonomics*, *39*(3), 429-460. doi:10.1080/00140139608964474

Münscher, R., & Kühlmann, T. M. (2012). Using critical incident technique in trust research. In F. Lyon, G. Möllering & M. N. K. Saunders (Eds.), *Handbook of Research Methods on Trust* (pp. 161-172). Cheltenham: Edward Elgar Publishing Limited.

Nass, C., & Moon, Y. (2000). Machines and mindlessness: Social responses to computers. *Journal of Social Issues*, *56*(1), 81-103. doi:10.1111/0022-4537.00153

Nass, C., Reeves, B., & Leshner, G. (1996). Technology and roles: A tale of two TVs. *Journal of Communication*, *46*(2), 121-128. doi:10.1111/j.1460-2466.1996.tb01477.x

Nass, C., Steuer, J., & Tauber, E. R. (1994). Computers are social actors. *Proceedings of the SIGCHI Conference on Human Factors in Computing Systems* (pp. 72-78). Boston, MA. doi: 10.1145/191666.191703

Nicholls, A. R., & Perry, J. L. (2016). Perceptions of coach–athlete relationship are more important to coaches than athletes in predicting dyadic coping and stress appraisals: an actor–partner independence mediation model. *Frontiers in Psychology*, *7*, 447. doi:10.3389/fpsyg.2016.00447

Nicholls, A. R., Earle, K., Earle, F., & Madigan, D. J. (2017). Perceptions of the Coach Athlete Relationship Predict the Attainment of Mastery Achievement Goals Six Months Later: A Two-Wave Longitudinal Study among FA Premier League Academy Soccer Players. *Frontiers in Psychology*, 8, 684. doi: 10.3389/fpsyg.2017.00684

Nickel, P. J. (2013). Trust in technological systems. In M. de Vries, S. Hansson, A. Meijers (Eds.). *Norms in Technology* (pp. 223-237). Springer, Dordrecht. doi: 10.1007/978-94-007-5243-6_14

Nickel, P. J. (2015). Design for the Value of Trust. In J. van den Hoven, P. E. Evermaas, I. van de Poel (eds.), *Handbook of Ethics, Values, and Technological Design: Sources, Theory, Values and Application Domains* (pp. 551-567). Springer Netherlands. doi:10.1007/978-94-007-6970-0_21

Nickel, P. J., Franssen, M., & Kroes, P. (2010). Can we make sense of the notion of trustworthy technology?. *Knowledge, Technology & Policy*, *23*(3-4), 429-444. doi:10.1007/s12130-010-9124-6

Nikbin, D., Hyun, S. S., Iranmanesh, M., & Foroughi, B. (2014). Effects of perceived justice

for coaches on athletes' trust, commitment, and perceived performance: A study of futsal and volleyball players. *International Journal of Sports Science & Coaching*, *9*(4), 561-578. doi:10.1260/1747-9541.9.4.561

Nissenbaum, H. (2011). A contextual approach to privacy online. *Daedalus*, *140*(4), 32-48.

Noblet, A. J., & Gifford, S. M. (2002). The sources of stress experienced by professional Australian footballers. *Journal of Applied Sport Psychology, 14*, 1-13. doi:10.1080/10413200209339007

Öksüz, A., Walter, N., Distel, B., Räckers, M., & Becker, J. (2016). Trust in the Information Systems Discipline. In Blöbaum, Bernd (Ed.). *Trust and Communication in a Digitized World* (pp. 205-223). Cham: Springer. doi: 10.1007/978-3-319-28059-2_12

Olson, G. M., & Olson, J. S. (2000). Distance matters. *Human–Computer Interaction*, *15*(2-3), 139-178. doi:10.1207/S15327051HCI1523_4

Olympiou, A., Jowett, S., & Duda, J. L. (2008). The psychological interface between the coach-created motivational climate and the coach-athlete relationship in team sports. *The Sport Psychologist, 22*, 423-438. doi:10.1123/tsp.22.4.423

Orlikowski, W. J., & Iacono, C. S. (2001). Research commentary: Desperately seeking the "IT" in IT research—A call to theorizing the IT artifact. *Information Systems Research*, *12*(2), 121-134.

Padberg, J. (2006). *Vertrauen im Leistungssport: Eine empirische Studie zur Vertrauensbeziehung zwischen Trainern und Athleten im Leistungstennis*. Frankfurt a. M., Lang.

Pavlou, P. A. (2003). Consumer acceptance of electronic commerce: Integrating trust and risk with the technology acceptance model. *International journal of electronic commerce*, *7*(3), 101-134. doi:10.1016/S1071-5819(03)00111-3

Pavlou, P. A., & Dimoka, A. (2006). The nature and role of feedback text comments in online marketplaces: Implications for trust building, price premiums, and seller differentiation. *Information Systems Research*, *17*(4), 392-414.

Pernice, I. E. A. (2013): Informationsgesellschaft und Politik: Vom Neuen Strukturwandel der Öffentlichkeit zur Global Privacy Governance. In: HIIG Discussion Paper Series, Nr. 2013-02. http://papers.ssrn.com/sol3/papers.cfm?abstract_id=2222046. (14.12..2017)

Pelletier, L. G., Fortier, M. S., Vallerand, R. J., & Briere, N. M. (2001). Associations among perceived autonomy support, forms of self-regulation, and persistence: A prospective study. *Motivation and Emotion*, *25*(4), 279-306. doi:10.1023/A:1014805132406

Peters, G. Y. (2014). The alpha and the omega of scale reliability and validity comprehensive assessment of scale quality. *European Health Psychologist*, *16*(2), 56–69.

Peters, L., & Karren, R. J. (2009). An examination of the roles of trust and functional diversity on virtual team performance ratings. *Group & Organization Management*, *34*(4), 479-504. doi:10.1177/1059601107312170

Peters, O. (2012): *Kritiker der Digitalisierung. Warner, Bedenkenträger, Angstmacher, Apokalyptiker*. Frankfurt am Main: Peter Lang Verlag.

Pettit, P. (1995). The cunning of trust. *Philosophy & Public Affairs*, *24*(3), 202-225. doi:10.1111/j.1088-4963.1995.tb00029.x

Pettit, P. (2004). Trust, reliance and the internet. *Analyse & Kritik*, *26*(1), 108-121. doi:10.1515/auk-2004-0106

Pfeffer, I., Würth, S., & Alfermann, D. (2004). Die subjektive Wahrnehmung der Trainer-Athlet-Interaktion in Individualsportarten und Mannschaftsspielen. *Zeitschrift für Sportpsychologie*, *11*(1), 24-32. doi:10.1026/1612-5010.11.1.24

Pousttchi, K. (2017). Digitale Transformation. In: N. Gronau, J. Becker, E. J. Sinz, L. Suhl, Leena, J. M. Leimeister, (Eds.). *Enzyklopädie der Wirtschaftsinformatik. Online-Lexikon*. München: Oldenbourg. Zugriff am 14.12.2017

Price, M. S., & Weiss, M. R. (2000). Relationships among coach burnout, coach behaviors, and athletes' psychological responses. *The Sport Psychologist*, *14*, 391-409. doi:10.1123/tsp.14.4.391

Pöppel, K. (2015): *Believe It or Not: The Effect of Athlete's Crisis Communication on Trustworthiness and Reputation in Case of Coping Allegations*. Doctoral Dissertation, Department of Sport Psychology University of Münster, Münster.

Railton, P. (2014). Reliance, trust, and belief. *Inquiry*, *57*(1), 122-150. doi:10.1080/0020174X.2014.858419

Ramis, Y., Torregrosa, M., Viladrich, C., & Cruz, J. (2017). The effect of coaches' controlling style on the competitive anxiety of young athletes. *Frontiers in Psychology*, *8*, 572, 1-7. doi: 10.3389/fpsyg.2017.00572

Reeves, B., & Nass, C. I. (1996). *The media equation: How people treat computers, television, and new media like real people and places*. Cambridge University Press.

Reichheld, F. F., & Schefter, P. (2000). E-loyalty: your secret weapon on the web. *Harvard Business Review*, *78*(4), 105-113.

Riemer, H. A. (2007). Multidimensional Model of Coach Leadership. In S. Jowette & D. Lavallee (Eds.), *Social Psychology in Sport* (pp. 57-73). Champaign, IL, US: Human Kinetics.

Riemer, H. A., & Toon, K. (2001). Leadership and satisfaction in tennis: Examination of congruence, gender, and ability. *Research Quarterly for Exercise and Sport*, *72*(3), 243-256. doi:10.1080/02701367.2001.10608957

Ring, P. S., & Van de Ven, A. H. (1992). Structuring cooperative relationships between organizations. *Strategic Management Journal*, *13*(7), 483-498. doi:10.1002/smj.4250130702

Robert, L. P., Denis, A. R., & Hung, Y. T. C. (2009). Individual swift trust and knowledge-based trust in face-to-face and virtual team members. *Journal of Management Information Systems*, *26*(2), 241-279. doi:10.2753/MIS0742-1222260210

Rocco, E. (1998). Trust breaks down in electronic contexts but can be repaired by some initial face-to-face contact. *Proceedings of the SIGCHI conference on Human factors in computing systems* (pp. 496-502). Los Angeles, Ca. doi:10.1145/274644.274711

Rocco, E., Finholt, T., Hofer, E. C., & Herbsleb, J. (2000). Designing as if trust mattered. *Collaboratory for Research on Electronic Work (CREW) Technical Report*. University of Michigan, Ann Arbor

Ropohl, G. (2009). *Allgemeine Technologie: Eine Systemtheorie der Technik*. KIT Scientific Publishing. doi: 10.26530/OAPEN_422388

Rosa, H. (2013). *Beschleunigung und Entfremdung: Entwurf einer kritischen Theorie spätmoderner Zeitlichkeit*. Berlin: Suhrkamp Verlag.

Rosseel, Y. (2012). Lavaan: An R package for structural equation modeling and more. Version 0.5–12 (BETA). *Journal of Statistical Software*, *48*(2), 1-36.

Rousseau, D. M., Sitkin, S. B., Burt, R. S., & Camerer, C. (1998). Not so different after all: A cross-discipline view of trust. *Academy of Management Review*, *23*(3), 393-404. Doi:10.5465/amr.1998.926617

Rutten, E. A., Stams, G. J. J., Biesta, G. J., Schuengel, C., Dirks, E., & Hoeksma, J. B. (2007). The contribution of organized youth sport to antisocial and prosocial behavior in adolescent athletes. *Journal of Youth and Adolescence, 36*, 255-264. doi:10.1007/s10964-006-9085-y

Ryan, R. M., & Deci, E. L. (2000). Self-determination theory and the facilitation of intrinsic motivation, social development, and well-being. *American Psychologist*, *55*(1), 68-78.

Saunders, M. N. (2012). Organizational trust: A cultural perspective. *Development and Learning in Organizations: An International Journal*, *26*(2). doi:10.1108/dlo.2012.08126baa.002

Schoorman, F. D., Mayer, R. C., & Davis, J. H. (2007). An integrative model of organizational trust: Past, present, and future. *Academy of Management Review,* 32(2), 344-354. doi:10.5465/amr.1995.9508080335

Schröder, H. D. (2006). Digitalisierung. In: Hans-Bredow-Institut (Ed.). *Medien von A bis Z.* (pp. 95-97) Wiesbaden, Verlag für Sozialwissenschaften.

Shankar, V., Urban, G. L., & Sultan, F. (2002). Online trust: a stakeholder perspective, concepts, implications, and future directions. *The Journal of Strategic Information Systems*, *11*(3-4), 325-344. doi:10.1016/S0963-8687(02)00022-7

Shapiro, D. L., Sheppard, B. H., & Cheraskin, L. (1992). Business on a handshake. *Negotiation Journal*, *8*(4), 365-377. doi:10.1111/j.1571-9979.1992.tb00679.x

Sherman, C. A., Fuller, R., & Speed, H. D. (2000). Gender comparisons of preferred coaching behaviors in Australian sports. *Journal of Sport Behavior*, *23*(4), 389-406.

Shields, D. L. L., Gardner, D. E., Light Bredemeier, B. J., & Bostro, A. (1997). The relationship between leadership behaviors and group cohesion in team sports. T*he Journal of Psychology*, *131*(2), 196-210. doi:10.1080/00223989709601964

Short, J., Williams, E., & Christie, B. (1976). *The social psychology of telecommunications.* London: Joh Wiley and Sons

Smith, R. E., Smoll, F. L., & Barnett, N. P. (1995). Reduction of children's sport performance anxiety through social support and stress-reduction training for coaches. *Journal of Applied Developmental Psychology*, *16*, 125-142. doi: 10.1016/0193-3973(95)90020-9

Smith, R. E., Smoll, F. L., & Cumming, S. P. (2007). Effects of a motivational climate intervention for coaches on young athletes' sport performance anxiety. *Journal of Sport and Exercise Psychology*, *29*, 39-59. doi: 10.1123/jsep.29.1.39

Smith, R. E., Smoll, F. L., & Curtis, B. (1979). Coach effectiveness training: A cognitive-behavioral approach to enhancing relationship skills in youth sport coaches. *Journal of Sport Psychology*, *1*(1), 59-75. doi:10.1123/jsp.1.1.59

Smith, R. E., Smoll, F. L., & Hunt, E. (1977). A system for the behavioral assessment of athletic coaches. *Research Quarterly. American Alliance for Health, Physical Education and Recreation*, *48*, 401-407. doi:10.1080/10671315.1977.10615438

Smoll, F. L., & Smith, R. E. (1989). Leadership behaviors in sport: A theoretical model and research paradigm. *Journal of Applied Social Psychology*, *19*, 1522-1551. doi:10.1111/j.1559-1816.1989.tb01462.x

Smoll, F. L., Smith, R. E., Barnett, N. P., & Everett, J. J. (1993). Enhancement of children's self-esteem through social support training for youth sport coaches. *Journal of Applied Psychology*, *78*(4), 602.

Smoll, F. L., Smith, R. E., Curtis, B., & Hunt, E. (1978). Toward a mediational model of coach-player relationships. *Research Quarterly. American Alliance for Health, Physical Education and Recreation*, *49*, 528-541. doi:10.1080/10671315.1978.10615567

Söllner, M., Hoffmann, A., & Leimeister, J. M. (2016). Why different trust relationships matter for information systems users. *European Journal of Information Systems*, *25*(3), 274-287. doi: 10.1057/ejis.2015.17

Söllner, M., Hoffmann, A., Hoffmann, H., Wacker, A., & Leimeister, J. M. (2012). *Understanding the formation of trust in IT artifacts.* Paper presented at The International Conference on Information Systems (ICIS), Orlando, Fl

Söllner, M., Hoffmann, A., Hoffmann, H., Wacker, A., & Leimeister, J. M. (2014). Understanding the Formation of Trust. In *Socio-technical Design of Ubiquitous Computing Systems* (pp. 39-58). Springer, Cham. doi: 10.1007/978-3-319-05044-7

Sousa, C., Smith, R. E., & Cruz, J. (2008). An individualized behavioral goal-setting program for coaches. *Journal of Clinical Sport Psychology*, *2*, 258-277. doi:10.1123/jcsp.2.3.258

Sitkin, S. B., & George, E. (2005). Managerial trust-building through the use of legitimating formal and informal control mechanisms. *International Sociology, 20*(3), 307-338. doi: 10.1287/orsc.4.3.367

Sitkin, S. B., & Roth, N. L. (1993). Explaining the limited effectiveness of legalistic "remedies" for trust/distrust. *Organization Science*, *4*(3), 367-392. doi:10.1287/orsc.4.3.367

Solomon, L. (1960). The influence of some types of power relationships and game strategies upon the development of interpersonal trust. *The Journal of Abnormal and Social Psychology*, *61*(2), 223. doi 10.1037/h0047571

Stebbings, J., Taylor, I. M., & Spray, C. M. (2016). Interpersonal mechanisms explaining the transfer of well-and ill-being in coach–athlete dyads. *Journal of Sport and Exercise Psychology, 38*, 292-304. doi:10.1123/jsep.2015-0172

Stewart, K. J. (2003). Trust transfer on the world wide web. *Organization Science*, *14*(1), 5-17. doi:10.1287/orsc.14.1.5.12810

Stieglitz, S. (2016). Social Media. In N. Gronau, J. Becker, E. J. Sinz, L. Suhl, Leena, J. M. Leimeister, (Eds.). *Enzyklopädie der Wirtschaftsinformatik. Online-Lexikon*. München: Oldenbourg. Zugriff am 14.12.2017

Straub, D., & Karahanna, E. (1998). Knowledge worker communications and recipient availability: Toward a task closure explanation of media choice. *Organization Science*, *9*(2), 160-175. doi:10.1287/orsc.9.2.160

Strickland, L. H. (1958). Surveillance and trust 1. *Journal of Personality*, *26*(2), 200-215. doi:10.1111/j.1467-6494.1958.tb01580.x

Sztompka, P. (1999). *Trust: A sociological theory*. Cambridge University Press.

Thelwell, R. C., Wagstaff, C. R., Rayner, A., Chapman, M., & Barker, J. (2017). Exploring athletes' perceptions of coach stress in elite sport environments. *Journal of Sports Sciences, 35*, 44-55. doi:10.1080/02640414.2016.1154979

Tillmar, M. (2012). 10 Cross-cultural comparative case studies: a means of uncovering dimensions of trust. In F. Lyon, G. Möllering & M. N. K. Saunders (Eds.), *Handbook of Research Methods on Trust* (pp. 102-109). Cheltenham: Edward Elgar Publishing Limited

Tomlinson, A., & Yorganci, I. (1997). Male coach/female athlete relations: Gender and power relations in competitive sport. *Journal of Sport and Social Issues*, *21*, 134-155. doi:10.1177/019372397021002003

Tullberg, J. (2008). Trust—The importance of trustfulness versus trustworthiness. *The journal of Socio-Economics*, *37*(5), 2059-2071. doi:10.1016/j.socec.2007.10.004

Turilli, M., Vaccaro, A., & Taddeo, M. (2010). The case of online trust. *Knowledge, Technology & Policy*, *23*(3-4), 333-345. doi:10.1007/s12130-010-9117-5

Valacich, J. S., Mennecke, B. E., Wachter, R. M., & Wheeler, B. C. (1994). *Extensions to media richness theory: A test of the task-media fit hypothesis*. Paper presented at Proceedings of the 27th Hawaii International Conference on System Sciences, Maui, Hawaii, 11-20, IEEE Computer Society

Vance, A., Elie-Dit-Cosaque, C., & Straub, D. W. (2008). Examining trust in information technology artifacts: the effects of system quality and culture. *Journal of Management Information Systems*, *24*(4), 73-100. doi: 10.2753/MIS0742-1222240403

Vazou, S., Ntoumanis, N., & Duda, J. L. (2006). Predicting young athletes' motivational indices as a function of their perceptions of the coach-and peer-created climate. *Psychology of Sport and Exercise*, *7*(2), 215-233. doi:10.1016/j.psychsport.2005.08.007

Wachsmuth, S., Jowett, S., & Harwood, C. G. (2017). Conflict among athletes and their coaches: what is the theory and research so far?. *International Review of Sport and Exercise Psychology*, *10*(1), 84-107.

Wagenbach, M. (2012): *Digitaler Alltag. Ästhetisches Erleben zwischen Kunst und Lifestyle*. München: Herbert Utz Verlag.

Walter, N., Katschewitz, S., Köffer, S., Ortbach, K., & Niehaves, B. (2014). *The influence of social presence on user-to-user support procedures*. Paper presented at Proceedings of the 22nd European Conference on Information Systems (ECIS 2014), Tel Aviv, Israel

Wang, N., Shen, X. L., & Sun, Y. (2013). Transition of electronic word-of-mouth services from web to mobile context: A trust transfer perspective. *Decision Support Systems*, *54*(3), 1394-1403.

Wang, W., & Benbasat, I. (2005). Trust in and adoption of online recommendation agents. *Journal of the Association for Information Systems*, *6*(3), 72-101.

Warkentin, M., & Beranek, P. M. (1999). Training to improve virtual team communication. *Information Systems Journal*, *9*(4), 271-289. doi:10.1046/j.1365-2575.1999.00065.x

Wei, L., & Yucetepe, V. (2013). *Research on relationship between goodwill trust, competence trust and alliance performance—Based on analysis on the moderating role of potential competition between partners*. Paper presented at 6th International Conference on Information Management, Innovation Management and Industrial Engineering, Xi-an, China, doi:10.1109/ICIII.2013.6703215

Wilcox, R. R. (2012). *Introduction to robust estimation and hypothesis testing*. Cambridge, Ma: Academic press.

Williams, E. (1977). Experimental comparisons of face-to-face and mediated communication: A review. *Psychological Bulletin*, *84*(5), 963. doi:10.1037/0033-2909.84.5.963

White, R. L., & Bennie, A. (2015). Resilience in youth sport: A qualitative investigation of gymnastics coach and athlete perceptions. *International Journal of Sports Science & Coaching*, *10*(2-3), 379-393. doi: 0.1260/1747-9541.10.2-3.379

Wylleman, P. (2000). Interpersonal relationships in sport: Uncharted territory in sport psychology research. *International Journal of Sport Psychology, 31*(4), 555-572.

Yamagishi, T., Kikuchi, M., & Kosugi, M. (1999). Trust, gullibility, and social intelligence. *Asian Journal of Social Psychology*, *2*(1), 145-161. doi:10.1111/1467-839X.00030

Zhang, Z. & Chelladurai, P. (2013). Antecedents and consequences of athlete's trust in the coach. *Journal of Sport and Health Science*, *2*(2), 115-121. doi:10.1016/j.jshs.2012.03.002

Zolin, R., Hinds, P. J., Fruchter, R., & Levitt, R. E. (2004). Interpersonal trust in cross-functional, geographically distributed work: A longitudinal study. *Information and Organization*, *14*(1), 1-26. doi:10.1016/j.infoandorg.2003.09.002

13. Appendix

A) Studie 1	Teilnehmerinformationen und Cover Story	S. 212
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Appendix A) Studie 1

Allgemeine Teilnehmerinformation über die Untersuchung

Institut für Sportwissenschaft

Herzlich willkommen bei unserer Studie "Trainingsprogramme zur Verbesserung der 3000m Laufzeit"! Wir danken Ihnen für Ihr Interesse an dieser Studie. Wir untersuchen mit dieser Studie, wie sich verschiedene Trainingsprogramme unterschiedlich auf die Laufleistung und die Motivation über 3000m auswirken.

Ablauf der Studie

Das folgende Experiment besteht aus einem 4-wöchigen Trainingsprogramm um Ihre Leistung in einem 3000m Lauf zu verbessern. Dafür erhalten Sie von unserer Trainerin einen Trainingsplan und haben 4 Wochen Zeit zu trainieren. Zu Beginn und am Ende werden Sie jeweils einen 3000m Lauf auf Zeit absolvieren.

Die Leistung in Ihrem ersten 3000m Lauf, den Sie gleich absolvieren werden, dient als Grundlage für Ihren Trainingsplan. Ihre Leistung aus dem Lauf wird an unsere Trainerin weitergegeben, die Ihnen daraus Ihren individuellen Trainingsplan erstellt. Um Sie kontaktieren zu können, sobald unsere Trainerin einen Trainingsplan für Sie erstellt hat, bitten wir Sie, uns eine E-Mail Adresse anzugeben. Bitte geben Sie eine E-Mail Adresse an, die Sie auch regelmäßig abrufen, damit wir Sie auf jeden Fall erreichen können.

Insgesamt werden Sie 4 Wochen lang trainieren. Der Trainingsplan wird verschiedene Läufe beinhalten, unter anderem Tempoläufe, Dauerläufe und Intervall Training. Die Studie beinhaltet also einen Trainingsplan, welcher körperlich belastend sein kann. Jede Woche werden Sie drei Einheiten haben, die Sie bitte möglichst alle durchführen. Um den Trainingsplan evaluieren zu können ist es wichtig, dass sie während dieser vier Wochen keine anderen Lauftrainings absolvieren.

In den 4 Wochen führen Sie bitte regelmäßig ein Trainingstagebuch, in dem Sie festhalten, wie Sie die Einheiten tatsächlich gestalten. Bitte notieren Sie sich für jede Laufeinheit wann Sie sie absolvieren (Uhrzeit), wie weit sie laufen (wenn Sie diese Information erfassen können, ansonsten eine grobe Schätzung) und wie lange sie dafür brauchen (min) sowie eine subjektive Einschätzung, wie anstrengend das Training war.

Jede Woche tauschen Sie sich mit unserer Trainerin aus, sodass sie Ihren Trainingsfortschritt überprüfen und den Trainingsplan individuell an Ihre Leistung und an Ihren Fortschritt anpassen kann. Dabei berichten Sie, wie das Training in der vergangen Woche geklappt hat und geben Ihrer Trainerin die Informationen aus Ihrem Trainingstagebuch. Ihre Trainerin wird Ihnen aus diesen Daten dann den Trainingsplan für die nächste Woche erstellen. Die Kommunikation zwischen Ihnen und der Trainerin ist vertraulich. Die Kommunikation wird nicht gespeichert und die Inhalte werden auch nicht mit in die Studie einfließen.

Im Folgenden sehen Sie einen schematischen Ablauf der Studie:

Was	Dauer
Begrüßung, Informierte Einwilligung, Gesundheits- und Demografischer Fragebogen	10min
Aufwärmen und 3000m Lauf	30min
4 wöchiges Trainingsprogramm mit regelmäßigem Austausch mit unserer Trainerin und Führen eines Trainingstagebuchs	4 Wochen
Abschlusstermin:	
Abschlussfragebogen	10min
Aufwärmen und 3000m Lauf	30min
Debriefing	10min
Gesamt Dauer	4 Wochen
Zeitaufwand für die Messungen des 3000m Laufs und dem Ausfüllen von Fragebögen	90 Minuten

Sollten Sie noch Fragen haben, wenden Sie sich damit bitte an die Versuchsleiterin.

Freiwilligkeit und Anonymität

Die Teilnahme an der Studie ist freiwillig. Sie können jederzeit und ohne Angabe von Gründen Ihre Einwilligung zur Teilnahme an dieser Studie widerrufen, ohne dass Ihnen daraus Nachteile entstehen. Auch wenn Sie die Studie vorzeitig abbrechen, haben Sie Anspruch auf eine entsprechende Vergütung für den bis dahin erbrachten Zeitaufwand.
Die im Rahmen dieser Studie erhobenen Daten und persönlichen Mitteilungen werden vertraulich behandelt. Diejenigen Mitarbeiter, die durch direkten Kontakt mit Ihnen über personenbezogene Daten verfügen, unterliegen der Schweigepflicht. Ihre Antworten und Ergebnisse werden nicht unter Ihrem Namen, sondern unter einer Nummer abgespeichert (siehe Datenschutz). Bitte machen Sie sich bewusst, dass die Ergebnisse der Studie als wissenschaftliche Publikation veröffentlicht werden können. Dies geschieht in anonymisierter Form, d. h. ohne dass Ihre Daten Ihrer Person zugeordnet werden können.

Datenschutz

Die Erhebung der Daten erfolgt pseudonymisiert, d. h. in namentlich nicht gekennzeichneter Form. Ihre Antworten und Ergebnisse werden unter einer Nummer gespeichert. Es existiert eine Kodierliste auf Papier, die Ihren Namen mit der Nummer verbindet, was für die Auswertung der Daten erforderlich sein könnte. Die Kodierliste ist nur den Projektmitarbeitern zugänglich; sie wird in einem abschließbaren Schrank aufbewahrt und nach der Datenerhebung vernichtet. Nach Vernichtung der Kodierliste liegen die Daten nur noch in vollständig anonymisierter Form vor; ein Rückschluss auf einzelne Probanden ist dann nicht mehr möglich. Die anonymisierten Daten werden mindestens 10 Jahre gespeichert. Sie können, wenn Sie möchten, auch zu einem späteren Zeitpunkt die Löschung aller von Ihnen erhobenen Daten verlangen. Wenn die Kodierliste einmal gelöscht ist, können wir Ihren Datensatz aber nicht mehr identifizieren. Deshalb können wir Ihrem Verlangen nach Löschung Ihrer Daten nur solange nachkommen, wie die Kodierliste existiert. Die Kodierliste wird 6 Monate nach Abschluss der Datenerhebung gelöscht (dies sollte spätestens Mitte 2017 der Fall sein).
Ihre E-Mail Adresse benötigen wir, um Sie zur Terminvereinbarung zu kontaktieren. Sie wird nicht an Dritte weitergegeben und nur während der Studie gespeichert. Unmittelbar nach Abschluss der Datenerhebung (also nachdem Sie Ihren zweiten 3000m Lauf gelaufen sind) wird Ihre E-Mail Adresse wieder gelöscht.

Vergütung

Für die Teilnahme an der Untersuchung erhalten Sie eine Vergütung in Höhe von 8 € pro Stunde. Die Vergütung wird Ihnen in bar ausgezahlt. Bei Empfang der Vergütung in bar müssen Sie eine Quittung mit Angabe Ihres Namens und Ihrer Adresse unterschreiben. Sie können nach Wahl auch eine Gutschrift von Versuchspersonenstunden erhalten.

Für Ihre Teilnahme an der Untersuchung wird Ihnen ein Zeitaufwand von 2,5 Stunden (1,5 Stunde für den Aufwand der zwei Messtermine des 3000m Laufs, 1 Stunde für den Aufwand das Trainingstagebuch regelmäßig zu führen und sich regelmäßig mit unserer Trainerin abzusprechen) vergütet. D.h. wenn Sie vollständig an der Studie teilnehmen, können Sie maximal 2,5 Versuchspersonenstunden oder 20 Euro erhalten.

Sollten Sie noch Fragen haben, wenden Sie sich damit gerne an die Versuchsleiterin.
Ansprechpartnerin für Rückfragen:
Sydney Querfurth
Telefon:
E-Mail:

Einwilligungserklärung
Institut für Sportwissenschaft

Titel der Studie: Evaluation verschiedener Trainings über 3000m

Ich (Name des Teilnehmers /der Teilnehmerin in Blockschrift)

_____

bin schriftlich über die Studie und den Versuchsablauf aufgeklärt worden. Ich habe alle Informationen vollständig gelesen und verstanden. Sofern ich Fragen zu dieser vorgesehenen Studie hatte, wurden sie von Herrn/Frau _____ vollständig und zu meiner Zufriedenheit beantwortet.

Mit der beschriebenen Handhabung der erhobenen Daten bin ich einverstanden. Die Aufzeichnung und Auswertung der Daten erfolgt pseudnonymisiert, d. h. unter Verwendung einer Zahl. Es existiert eine schriftliche Kodierliste, die meinen Namen mit dem Code verbindet. Mir ist bekannt, dass ich mein Einverständnis zur Aufbewahrung bzw. Speicherung dieser Daten widerrufen kann, ohne dass mir daraus Nachteile entstehen. Ich bin darüber informiert worden, dass ich jederzeit eine Löschung all meiner Daten verlangen kann, solange die Kodierliste existiert. Wenn diese gelöscht wurde (6 Monate nach Abschluss der Datenerhebung) kann ich keine Löschung meiner Daten mehr verlangen. Ich bin einverstanden, dass meine anonymisierten Daten zu Forschungszwecken weiter verwendet werden können und mindestens 10 Jahre gespeichert bleiben.

Ich hatte genügend Zeit für eine Entscheidung und bin bereit, an der o.g. Studie teilzunehmen. Ich weiß, dass die Teilnahme an der Studie freiwillig ist und ich die Teilnahme jederzeit ohne Angaben von Gründen beenden kann. Ich weiß, dass ich in diesem Fall Anspruch auf eine Vergütung / Versuchspersonenstunden für die bis dahin erbrachten Stunden habe.

Eine Ausfertigung der Teilnehmerinformation über die Untersuchung und eine Ausfertigung der Einwilligungserklärung habe ich erhalten. Die Teilnehmerinformation ist Teil dieser Einwilligungserklärung. Ihr Namen steht nur auf dieser Einwilligungserklärung. Diese Einverständniserklärung wird getrennt aufbewahrt; die darin enthaltenen persönlichen Angaben werden nicht gespeichert. Nach Studienende (Ende 2016) wird die Einverständniserklärung vernichtet. Eine Zuordnung der erhobenen Daten zu einer bestimmten Person ist dann nicht mehr möglich.

_____ _____

Ort, Datum, & Unterschrift des Teilnehmers/der Teilnehmerin — Name des Teilnehmers/der Teilnehmerin in Druckschrift

_____ _____

Ort, Datum & Unterschrift der Versuchsleiter*in — Name der Versuchsleiter*in in Druckschrift

Bei Fragen oder anderen Anliegen kann ich mich an folgende Personen wenden:

Versuchsleiterin: *Sydney Querfurth* *Horstmarer Landweg 62b, Raum 116*	Projektleiterin: Sydney Querfurth Horstmarer Landweg 62b, Raum 116

Fragebogen zum Trainerverhalten

Im Folgenden sehen Sie eine Reihe von Aussagen über Ihre Trainerin. Überlegen Sie sich für jede Aussage, inwiefern Sie ihr zustimmen oder nicht. Zu Beantwortung steht Ihnen eine Skala von 1 (=stimme überhaupt nicht zu) bis 7 (stimme voll und ganz zu) zur Verfügung.

Bitte antworten Sie jeweils spontan und so, wie Sie es als am richtigsten einschätzen. Es gibt keine „richtigen" oder „falschen" Antworten, sondern mich interessiert Ihre Einschätzung. Bitte versuchen Sie alle Aussagen zu beantworten und keine zu überspringen, auch wenn es sich vielleicht so anfühlt, als ob sich manche Aussagen wiederholen.

	Stimme überhaupt nicht zu						Stimme voll und ganz zu
	1	2	3	4	5	6	7
Meine Trainerin ist sehr kompetent in der Ausführung ihrer Aufgaben/Jobs.	☐	☐	☐	☐	☐	☐	☐
Meine Trainerin ist dafür bekannt, in den Dingen erfolgreich zu sein, die sie versucht zu tun.	☐	☐	☐	☐	☐	☐	☐
Meine Trainerin hat ein großes Wissen, über die Dinge, die gemacht werden müssen.	☐	☐	☐	☐	☐	☐	☐
Ich bin sehr zuversichtlich in Bezug auf die Fähigkeiten meiner Trainerin.	☐	☐	☐	☐	☐	☐	☐
Meine Trainerin verfügt über spezielle Fähigkeiten, die meine Leistung steigern können.	☐	☐	☐	☐	☐	☐	☐
Meine Trainerin ist sehr gut qualifiziert.	☐	☐	☐	☐	☐	☐	☐
Meine Trainerin ist sehr besorgt um mein Wohlbefinden.	☐	☐	☐	☐	☐	☐	☐
Meine Bedürfnisse und Wünsche sind meiner Trainerin sehr wichtig.	☐	☐	☐	☐	☐	☐	☐

	Stimme überhaupt nicht zu						Stimme voll und ganz zu
	1	2	3	4	5	6	7
Meine Trainerin passt sehr darauf auf, was mir wichtig ist.	☐	☐	☐	☐	☐	☐	☐
Meine Trainerin nimmt zusätzlich Mühen auf sich, um mir zu helfen.	☐	☐	☐	☐	☐	☐	☐
Meine Trainerin hat einen starken Sinn für Gerechtigkeit.	☐	☐	☐	☐	☐	☐	☐
Ich brauche mich nie fragen, ob meine Trainerin ihr Wort hält.	☐	☐	☐	☐	☐	☐	☐
Meine Trainerin strengt sich im Umgang mit anderen sehr an, fair zu sein.	☐	☐	☐	☐	☐	☐	☐
Ich mag die Werte, für die meine Trainerin einsteht.	☐	☐	☐	☐	☐	☐	☐
Vernünftige Prinzipien scheinen das Verhalten von meiner Trainerin zu lenken.	☐	☐	☐	☐	☐	☐	☐

Aufklärung über die Untersuchung
Institut für Sportwissenschaft

Lieber Teilnehmer,
Sie haben an unserer Studie mit dem Titel „Trainingsprogramme zur Verbesserung der 3000m Laufzeit“ teilgenommen. Dabei haben wir Ihnen mitgeteilt, dass es darum ging, verschiedene Trainingsprogramme zu evaluieren. Dies war allerdings nur eine Coverstory, um das wahre Ziel der Studie geheim zu halten. Dadurch wollten wir verhindern, dass Sie sich zu viele Gedanken über die Themen machen, die uns wirklich interessieren. So wollten wir sogenannte „Versuchspersonen Effekte“ verhindern, d.h. wir wollten verhindern, dass Ihre Meinung über unser Forschungsziel Ihre Ergebnisse beeinflusst.
Tatsächlich wollten wir untersuchen, wie sich verschiedene Formen der Kommunikation auf die Beziehung zwischen Sportlern und Trainer*in auswirkt. Genau genommen haben wir uns angeschaut, wie sich Vertrauen zwischen einem Sportler oder einer Sportlerin und dem Trainer oder der Trainerin entwickelt. Manche Teilnehmer hatten face-to-face Termine mit der Trainerin, während andere nur oder in Teilen über eine Trainingsplattform und E-Mail kommuniziert haben.
Da wir nicht wollten, dass Sie sich bewusst mit dieser Frage auseinander setzen, haben wir Ihnen nicht von Anfang an erzählt, worum es tatsächlich in dieser Studie ging. Wir wollten nicht den Trainingsplan evaluieren, alle Teilnehmer haben nach dem gleichen Prinzip trainier. Das Training wurde von einer Sportwissenschaftlerin erstellt, die bereits viel Erfahrung im Bereich Trainingswissenschaft und Lauftraining hat. Die Zeiten und das Niveau wurden individuell auf Ihre Leistung angepasst. Sie haben also wirklich ein personalisiertes, effektives Lauftraining erhalten. Uns hat nur weniger Interessiert, wie sich Ihre Laufleistung verbessert. Vielmehr hat uns interessiert, wie sich das Vertrauen zu der Trainerin entwickelt, in Abhängigkeit verschiedener Kommunikationsformen.
Nachdem Sie nun über den wahren Inhalt der Studie aufgeklärt wurden, bitten wir Sie noch einmal, uns Ihr Einverständnis zu geben, Ihre Daten zu wissenschaftlichen Zwecken zu verwenden.
Ich (Name des Teilnehmers /der Teilnehmerin in Blockschrift)

_____

bin schriftlich und mündlich über die Täuschung und den wahren Inhalt der Studie aufgeklärt worden. Ich habe alle Informationen vollständig gelesen und verstanden. Sofern ich Fragen zu der Täuschung und der anschließenden Aufklärung hatte, wurden sie von Herrn/Frau _____ vollständig und zu meiner Zufriedenheit beantwortet. Mit meiner Unterschrift gebe ich an, dass ich damit einverstanden bin, dass meine Daten in anonymer Form zu wissenschaftlichen Zwecken verwendet werden.

_____ _____

Ort, Datum & Unterschrift des Teilnehmers/der Teilnehmerin | Name des Teilnehmers/der Teilnehmerin in Druckschrift

Sollten Sie noch Fragen haben, wenden Sie sich damit gerne an den Versuchsleiter*in.
Ansprechpartnerin für Rückfragen:
Sydney Querfurth, Telefon:
E-Mail:

Appendix B) Studie 2

German translation of the English original Questionnaire on trust in technology by McKnight, et al. (2011)

Reliabilität	
1. Excel is a very reliable piece of software. 2. Excel does not fail me 3. Excel is extremely dependable. 4. Excel does not malfunction for me	1. Diese App scheint eine sehr zuverlässige Software zu sein. 2. Diese App scheint mich nicht zu enttäuschen. 3. Diese App erscheint mir extrem verlässlich. 4. Diese App scheint gut zu funktionieren.
Funktionalität	
1. Excel has the functionality I need. 2. Excel has the features required for my tasks. 3. Excel has the ability to do what I want it to do.	1. Diese App hat die Funktionalität, welche ich benötige. 2. Diese App hat die Funktionen, die ich für mein Training benötige. 3. Diese App hat die Leistungsfähigkeit, um das zu tun, was ich tun will.
Hilfe-Funktion	
1. Excel supplies my need for help through a help function. 2. Excel provides competent guidance (as needed) through a help function. 3. Excel provides whatever help I need2. 4. Excel provides very sensible and effective advice, if needed.	1. Die App bedient mein Bedürfnis nach Hilfe durch eine Hilfefunktion. 2. Die App bietet mir (bei Bedarf) kompetente Leitung durch eine Hilfefunktion. 3. Die App bietet mir jede Hilfe, die ich brauche. 4. Die App bietet bei Bedarf vernünftige und effektive Ratschläge.
Situational normality	
1. I am totally comfortable working with spreadsheet products. 2. I feel very good about how things go when I use spreadsheet products. 3. I always feel confident that the right things will happen when I use spreadsheet products. 4. It appears that things will be fine when I utilize spreadsheet products.	1. Ich fühle mich total wohl, wenn ich mit einer Fitness App arbeite. 2. Ich habe ein gutes Gefühl darüber wie es läuft, wenn ich eine Fitness App verwende. 3. Ich bin zuversichtlich, dass alles gut laufen wird, wenn ich eine Fitness App verwende. 4. Es hat den Anschein, dass alles gut sein wird, wenn ich die Fitness App nutze.
Structural Assurance	
1. I feel okay using spreadsheet products because they are backed by vendor protections. 2. Product guarantees make it feel all right to use spreadsheet software. 3. Favorable-to-consumer legal structures help me feel safe working with spreadsheet products. 4. Having the backing of legal statutes and processes makes me feel secure in using spreadsheet products.	1. Es ist für mich in Ordnung, Fitness Apps zu verwenden, da sie durch die Verkäufer geschützt sind. 2. Aufgrund von Produktgarantien fühlt es sich gut an, Fitness Apps zu verwenden. 3. Günstige Verbraucherschutz-Bestimmungen führen beim Gebrauch von Fitness Apps zu einem sicheren Gefühl. 4. Rechtliche Satzungen und Vorgänge geben mir ein sicheres Gefühl, wenn ich Fitness Apps benutze.
Faith in general Technology	
1. I believe that most technologies are effective at what they are designed to do. 2. A large majority of technologies are excellent. 3. Most technologies have the features needed for their domain. 4. I think most technologies enable me to do what I need to do.	1. Ich glaube, dass die meiste Technik effizient darin ist, das zu tun, wozu sie entwickelt wurde. 2. Eine große Mehrheit der Technologien ist hervorragend. 3. Die meisten Technologien haben die Bestandteile, die sie für ihren Bereich brauchen. 4. Ich glaube, die meisten Technologien ermöglichen mir das zu tun, was ich muss.
Trusting Stance general technology	
1. My typical approach is to trust new technologies until they prove to me that I shouldn't trust them. 2. I usually trust a technology until it gives me a reason not to trust it. 3. I generally give a technology the benefit of the doubt when I first use it.	1. Mein übliches Vorgehen sieht so aus, dass ich einer neuen Technologie so lange vertraue, bis diese mir zeigt, dass ich ihr nicht mehr vertrauen sollte. 2. Normalerweise vertraue ich einer Technologie solange, bis sie mir einen Grund gibt, ihr nicht mehr zu vertrauen 3. Üblicherweise vertraue ich im Zweifel einer Technologie, wenn ich das erste mal mit ihr arbeite.

All Items to be answered on a 7-point Likert scale ranging from 1 (disagree entirely) to 7 (agree entirely)

Appendix C) Studie 3 – Allgemeine Situationsbeschreibung

Im Folgenden wird Ihnen nun die allgemeine Situation dargestellt. Bitte lesen Sie sich die Beschreibung aufmerksam durch. Wenn Sie anschließend auf den Button weiter klicken, gelangen Sie auf die nächste Seite.

Du arbeitest bereits seit einer Saison mit deiner jetzigen Trainerin Petra/ deinem jetzigen Trainer Peter zusammen. Petra/Peter hat die Trainer B Lizenz Leistungssport und arbeitet seit 8 Jahren als Personal Trainerin/Personal Trainer. Sie/Er hat selber bereits mehrere Marathons (Bestzeit 3:14:55/ Bestzeit 2:50:12) sowie Triathlons inklusive eines Ironmans (Bestzeit 09:35:45/ Bestzeit 8:49:43) absolviert.
Du arbeitest gerne mit Petra/Peter zusammen und kommst gut mit ihr/ihm klar. Um dein Training optimal abzustimmen, arbeitet Petra/Peter mit deiner Herzfrequenz. Sie/Er nutzt diese, um die Intensität des Trainings zu steuern. Insgesamt kommst du mit Petras/Peters Trainingsphilosphie sehr gut klar und magst ihre/seine Methoden. Sie/Er ist eine kompetente Trainerin/ein kompetenter Trainer und du merkst, dass ihr/ihm dein sportlicher Fortschritt wichtig ist. Sie/Er arbeitet sehr gewissenhaft und hält sich immer an Absprachen, die ihr trefft.

Da Petra/Peter in der Nachbarstadt eine Stunde entfernt wohnt und arbeitet, habt ihr überwiegend per E-Mail oder Telefon kommuniziert. Einmal pro Monat habt ihr euch zum persönlichen Gespräch getroffen. In der letzten Saison hattest du dir das Ziel gesetzt, deinen ersten Wettkampf zu bestreiten. Nach ausführlicher Leistungsdiagnostik zu Beginn, hat Petra/Peter deinen Trainingsplan geschrieben. Im Verlauf der Saison hat sie/er ihn immer individuell an deinen Fortschritt angepasst, sodass du am Ende dein Ziel erreicht hast. Für diese Saison hast du dir nun vorgenommen, eine neue Bestzeit im Wettkampf zu erzielen. Um diese neue Bestzeit zu erreichen, liegt der Schwerpunkt des Trainings auf Intervall- und Tempoeinheiten. Es ist für dein Training wichtig, die Intervalle richtig einteilen und steuern zu können.

In der neuen Saison möchte Petra/Peter nun mit dir eine neue Trainingssoftware einsetzen. Zur Kommunikation und Trainingssteuerung setzt sie/er nun auf die Trainingsplattform „*OnlineActive*“, zusammen mit der neuen GPS Sport Uhr „*SmartWatch Active*“. Es ist Petra/Peter wichtig, dass ihr mit dieser Software arbeitet und sie/er betont, dass sie/er bereits gute Erfahrungen mit der Technik gemacht hat.

Mit deiner Sportuhr trackst du deine Ausdauer Einheiten über GPS. Zusätzlich wird deine Herzfrequenz erfasst. Die Daten können von der Uhr in die digitale Plattform geladen werden. Petra/Peter kann auf die Daten zugreifen und lädt dann von ihrer Seite aus neue Trainingspläne in die Plattform. Zusätzlich gibt es eine Chat-Funktion, in der ihr euch Nachrichten schreiben könnt. Über eine Kommentarfunktion kannst du in den Trainingsplänen anmerken, wie dir bestimmte Einheiten gefallen haben.

Neben persönlicher Trainingsbeobachtung und face-to-face Gesprächen einmal im Monat, kommunizierst du überwiegend mit Petra/Peter über die Trainingsplattform.

Auf den folgenden Seiten siehst du ein paar Screenshots aus der Trainingswebsite „OnlineActive“, die Petra/Peter zusammen mit dir nutzt.

Kurzversion des Vertrauen in den Trainer Fragebogens (Dreiskämper, et al., in prep)

Vertrauenswürdigkeit	**Stimme überhaupt nicht zu**	**Stimme eher nicht zu**	**Stimme teilweise zu**	**Stimme eher zu**	**Stimme absolut zu**
Peter/Petra ist sehr kompetent in der Ausführung seiner/ihrer Aufgaben/Jobs (*Wettkampfplanung*).	○	○	○	○	○
Peter/Petra ist sehr besorgt um mein Wohlbefinden.	○	○	○	○	○
Peter/Petra hat einen starken Sinn für Gerechtigkeit.	○	○	○	○	○
Ich bin sehr zuversichtlich in Bezug auf Peter/Petra's Fähigkeiten	○	○	○	○	○
Meine Bedürfnisse und Wünsche sind Peter/Petra sehr wichtig.	○	○	○	○	○
Peter/Petra strengt sich im Umgang mit anderen sehr an, fair zu sein.	○	○	○	○	○
Peter/Petra ist sehr gut qualifiziert.	○	○	○	○	○
Peter/Petra passt sehr darauf auf, was mir wichtig ist.	○	○	○	○	○
Vernünftige Prinzipien scheinen das Verhalten von Peter/Petra zu lenken.	○	○	○	○	○

14. Erklärungen

Erklärungen zu den Eigenanteilen	S. 223
Erklärung zur Eigenständigkeit	S. 225
Persönliche Erklärungen nach §6 Promotionsordnung	S. 225
Curriculum Vitae mit Schriftenverzeichnis	S. 226

Erklärung der Promovendin
zum eigenen Anteil an den vorgelegten wissenschaftlichen Abhandlungen

Promovend/Promovendin: Sydney Querfurth-Böhnlein

Titel der Dissertation: Trust in the coach-athlete relationship through digital communication

Studie 1

Titel	Trust in coach within digital and face to face context		
Publikationsstatus:	nicht eingereicht	**x**	(bitte ankreuzen)
	eingereicht		
	in Begutachtung		
	in Revision		
	angenommen		
	veröffentlicht		Publikationsjahr:
Beschreibung des eigenen Anteils, wenn **keine** Alleinautorenschaft vorliegt: Die Studie wurde unterstützt durch eine Masterarbeit von Judith Besse, ein Forschungsprojekt von Sandra Goertz sowie Edda van Meurs als studentische Hilfskraft. Idee, Projektplanung, Kommunikationsscript, E-Mails, Auswertung und Verschriftlichung erfolgten ausschließlich durch mich. Frau Besse und Frau van Meurs unterstützen indem sie die Rolle der Trainerinnen in der Studie übernehmen. Frau Goertz unterstütze bei der Datenerhebung. Frau Besse analysierte die Daten separat für ihre Masterarbeit.			

Studie 2

Titel	Validation of trust in technology for sport and exercise technologies		
Publikationsstatus:	nicht eingereicht	**x**	(bitte ankreuzen)
	eingereicht		
	in Begutachtung		
	in Revision		
	angenommen		
	veröffentlicht		Publikationsjahr:

Beschreibung des eigenen Anteils, wenn **keine** Alleinautorenschaft vorliegt:
Die Idee zur Studie, methodische Planung, Vorbereitung, Zusammenstellung und (Re-) analysen der Daten, sowie Auswertung und Verschriftlichung erfolgten durch mich. In den Gesamtdatensatz flossen Daten mit ein, für die Lena Busch im Rahmen ihrer Dissertation verantwortlich war. Lena Busch hat die Daten für ihre Dissertation separat ausgewertet.

Studie 3

Titel	Trust transfer effects within the coach-athlete relationship – Trust in technology and trust in coach		
Publikationsstatus:	nicht eingereicht	**x**	(bitte ankreuzen)
	eingereicht		
	in Begutachtung		
	in Revision		
	angenommen		
	veröffentlicht		Publikationsjahr:

Beschreibung des eigenen Anteils, wenn **keine** Alleinautorenschaft vorliegt:
Die Studie wurde unterstützt durch die Bachelorarbeit von Frau Lisa Förster. Die Idee, der methodische Ansatz und die theoretischen Überlegungen der Arbeit stammen von mir. Frau Förster unterstütze mich in der Konstruktion der Vignetten, sowie in der Projektdurchführung und Datenerhebung. Die Ergebnisauswertung und die Verschriftlichung der Ergebnisse erfolgten eigenständig durch mich. Frau Förster nutzte die Daten für ihre Bachelorarbeit separat.

Hiermit versichere ich die Richtigkeit der Angaben zu den Eigenanteilen an den Studien dieser Arbeit.

Münster, den 06.09.2018 Sydney Querfurth-Böhnlein

Erklärung zur Eigenständigkeit der Arbeit

Hiermit versichere ich,
dass ich die vorgelegte Dissertation selbst und ohne unerlaubte Hilfe angefertigt habe, dass ich alle in Anspruch genommenen Quellen und Hilfsmittel in der Dissertation angegeben habe und dass ich die Dissertation nicht bereits anderweitig als Prüfungsarbeit vorgelegen habe.

Münster, den 06.09.2018 Sydney Querfurth-Böhnlein

Persönliche Erklärung

Hiermit erkläre ich, dass ich nicht wegen eines Verbrechens, zu dem ich meine wissenschaftliche Qualifikation missbraucht habe, verurteilt (§ 6 (3) Promotionsordnung) wurde.

Münster, den 06.09.2018 Sydney Querfurth-Böhnlein