

Social Networks in Music

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Abstract

To support their practice during their acquisition of expertise, musicians need to be part of a collective. Adopting a social network approach, a collective can be defined a social network consisting of network actors and relational ties (e.g., support for practice). Because the composition of and the support provided by network actors changes across time, research in music could benefit from a social network approach to identify the relevant network actors, their support for music practice, and changes in these networks. This dissertation focuses on popular music and provides insights into how music practice and the development of expertise is supported by network actors in a rather informal practice setting.

The overall aim of this dissertation was to examine how social networks supported the practice of popular musicians during their acquisition of expertise. Therefore, three research questions were addressed: 1) How are networks that support the practice of popular musicians during different developmental phases of expertise composed? 2) How do network actors of popular musicians provide support for practice during different phases of expertise development? 3) How do networks supporting the practice of popular musicians change between different phases of expertise development? Three studies, subsequently published in peer-reviewed journals, were conducted to address these aims. Study 1 investigated differences in the composition of social network actors and how network actors supported the deliberate practice of expert and intermediate popular musicians during different phases of expertise development. Study 2 focussed more generally on the support by “persons in the shadow” (defined as peers, parents, and teachers) of expert, intermediate and amateur guitarists performing popular music. Study 3 investigated how networks of experts and intermediate popular musicians changed across different phases of expertise development.

The results of the three studies revealed that band members and instrumental teachers were the main supporters of musicians’ (deliberate) practice during the acquisition of expertise. This extends prior research on deliberate practice by acknowledging that not only teachers, but also other network actors are supportive during the development of expertise in popular music. It was also found that the networks of expert popular musicians changed more between different timespans. In addition, in comparison to intermediate musicians, experts had more network actors available to support the different aspects of deliberate practice. Finally, this dissertation suggests directions for future research on expertise development, deliberate practice, and social networks in music and other domains.

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1. Introduction

In research literature, different terms like social environment or communities of practice are used to describe the collections of people who support individuals during practice (Kenny, 2016; Moore et al., 2003), but without using a social network perspective. Yet social networks have been found to be significant for life-long music learning (Velben, 2018) and to play a major role in supporting musicians in the acquisition of musical skills (Crossley et al., 2014; Gruber et al., 2008; Lehmann & Kristensen, 2014). One of these aforementioned terms is “persons in the shadow”, who are said to play a major role in supporting musicians during the acquisition of expertise, but often remain unrecognized by researchers, the audience or even the musicians themselves (Gruber et al., 2008; Lehmann & Kristensen, 2014). A reason why such persons remain unrecognized is that individual talent is said to be a necessary precondition to reach excellence and the focus of research is on individual or inborn traits (Lehmann & Kristensen, 2014). In contrast to research on inborn factors of talent development, research on expertise highlights the role of practice. In particular, the concept of deliberate practice seems to be a key to reaching an expert level in music (Platz et al., 2014). As actors from the social network are said to provide support for the acquisition of expertise, they might provide the necessary support for successful deliberate practice, too. Research has neglected to investigate who the relevant network actors are and how they support deliberate practice.

As the acquisition of expertise is a long-term process, several developmental models have been introduced in attempts to capture and structure the different phases individuals need to go through before reaching expertise (Bloom, 1985; Ericsson et al., 1993; Fitts & Posner, 1967; Hallam, 1998; Manturzewska, 1990; Papageorgi et al., 2009). It seems obvious that the composition of network actors and the kinds of support they provide are constantly changing during these phases, because network actors enter or leave the network over time (Feld et al., 2007). Presumably, this change has a strong impact on who supports the musicians and the kinds of support that are provided. Nevertheless, research has neglected to investigate change in social networks during the phases of expertise development.

Performing on an expert level is strongly domain-specific (Hallam & Bautista, 2012). In music, it might even be the case that the necessary performance skills depend on the conditions of the musical genre and/or the instrument (Sloboda, 2000). For example, most popular musicians are required to be creative and constantly creating new pieces of music, while classical musicians are required to have notation-reading skills to perform works

from a pre-existing repertoire. Such differences have a direct influence on the practice content, how practice is organised, and which people support practice. Although of strong social and cultural relevance, research in music is lacking investigation into the popular music genre and almost no research has been devoted to social networks and their support for deliberate practice in this context.

All in all, relatively little is known about who the relevant network actors are, how they support popular musicians during practice, and how such networks change during the development of expertise, although research agrees that a solid social network is needed to acquire expertise. The aim of this dissertation is to uncover the relevant network actors, to analyse how they support musical practice, and to examine how the networks change during the acquisition of expertise. The findings of the dissertation contribute to scientific discussions of the role of social networks, deliberate practice and the development of expertise in music, but also in other domains. In addition, the findings can be used to inform both institutions teaching popular music (e.g., music schools, music academies) and individual musicians about how social networks support musical practice during the acquisition of expertise.

2. Theoretical conceptualisation

2.1 Social networks in music

Social networks provide a context where the contents of practice are defined and individuals are guided during music practice (Gruber et al., 2008), but research in this field is limited. Using a social network perspective in music research can contribute to a more detailed understanding of existing terms that describe the relevance of other individuals supporting music practice. In general, a social network is defined as a set of network actors (or nodes) that are connected through different relational ties with each other (Marin & Wellman, 2011). Network actors might be human individuals, like teachers, parents, or peers (Lehmann & Kristensen, 2014), but also objects (e.g., books). The relational ties between network actors and the individual are manifold and might reach from support for goal setting to providing the necessary motivation to endure demanding practice processes. Relational ties within the social network are fluid, changeable, and dynamic and can be used to inform, challenge, broaden, and transform conceptualisations and representations of the meaning of music learning in everyday lives (O'Neill, 2012).

Understanding different terms as social networks

Different terms that could be described and understood as social networks appear in research.

“Social environment” is a common term in research, which is used to summarize all kinds of individual relations to another individual (e.g., by providing support). Using this term only gives an approximate picture of this issue. Social network analysis can be used to explicitly describe which individuals form this social environment and which relations exist between the individuals in terms of support they provide during practice.

“Communities of practice” is another term which is used in different research traditions. A community of practice is defined as a joint enterprise of individuals with a shared repertoire and mutual engagement toward a common goal (Wenger, 1998). Kenny (2016) uses this term for investigations of communities of musical practice which are created through practices in which “rules, membership, roles, identities and learning are ‘both’ shared through collective music endeavour and ‘situated’ within certain sociocultural contexts” (p. 1). The definition implies that roles, rules, learning, and the identity of the network actors are defined by working towards a common goal, but it is vague in relation to who relevant network actors are and how they are interrelated to an individual music learner or between each other.

The term “persons in the shadow” (Gruber et al., 2008; Lehmann & Kristensen, 2014) addresses the difficulties with these aforementioned terms by stating that relevant supporters of expertise development stand in the shadow of the expert and often remain unrecognized. The authors explain that these network actors have a strong supportive role during the acquisition of expertise by guiding the practising musician to attain highest performance levels. Persons in the shadow, whose role is perceived positively and supportive during practice, are called “bright” persons in the shadow. “Dark” persons in the shadow are perceived as negative by showing anti-pedagogical behaviour (Lehmann & Kristensen, 2014). However, both types of persons in the shadow can be relevant to the acquisition of expertise.

In conclusion, all of these terms acknowledge that several persons contribute to the development of expertise in music by means of support during practice. By using social network analysis, possibilities are offered to systematically analyse these terms by exposing which network actors make up a support network and how their relations in terms of support are perceived from the perspective of a musician.

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Network actors and relations

Research has mainly focused on explaining the roles of particular network actors in the support of musicians (e.g., the role of teachers, the role of parents) during the acquisition of expertise, rather than investigating the whole social network. According to the social network perspective, these network actors have relational ties to the individual through which they provide different kinds of support for the practice of musical content.

Hallam (2011) mentioned parents, teachers, and peers as sources of reward and feedback for young musicians. Parents are often the first supporters of musical practice of their children by shaping their motivation and musical engagement (McPherson, 2009) or providing physiological, psychological, and financial support (Creech, 2016; Creech & Hallam, 2011). Through providing a musical household, or through engaging themselves with the playing of music, parents can provide a space for children to develop their musical skills. Usually, their support continues through childhood and diminishes after the child leaves the household for an apprenticeship or a professional career.

Most studies see teachers as the main source of the learning content necessary for the acquisition of musical expertise. This is probably owing to the traditional point of view on music learning, with master-apprenticeship in the foreground (Hanken, 2016). Music teachers should aim to help their students to attain the best performance possible (McPherson & McCormick, 2006). They should have a strong knowledge base and a deep understanding of the subject and musical qualities, but also know how to organise lessons and deliver content (Biasutti & Concina, 2018). Throughout their musical development, musicians might come into contact with different teachers from different musical backgrounds shaping their musical skills. The influence of teachers usually lasts from childhood through an apprenticeship, if the musician enters a conservatory or a music university. In later years, professional musicians might occasionally attend master classes by other expert musicians, helping them to develop their skills further.

Less research has been devoted to the role of peers in the support for practice. Green (2002) mentioned that popular musicians prefer informal learning settings with peers and that formal lessons were rather a supplement to this peer learning. Lebler (2008) found similar results. Instead of teachers, it is peers that accompany the practice of young musicians in popular music. Furthermore, feedback by peers seems to be more important for the popular musicians than the feedback by their teachers. Young musicians develop the sense of their musical selves together with peers, as they provide a more relaxed and informal learning context (Moore et al., 2003). Practising with peers provides opportunities

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to discuss problems with learning and enhance motivation to engage in practising (Nielsen et al., 2018). From childhood on throughout their professional careers, musicians engage in playing music together with their peers. In classical music this might be in orchestras, in popular music this might be in bands, or in jazz, jam sessions. In their qualitative study on individual and collective music settings, Schiavio et al. (2019) provided insights that students have positive experiences during musical learning when it involved cooperation to explore musical possibilities freely with teachers and peers.

Besides these three kinds of network actors, whose role is rather prominent in research, other actors from the social network might also be relevant for music practice. For example, mentors are often mentioned for guiding musicians' practice (Lehmann & Kristensen, 2014), as are idols which are admired by young as well as adult musicians (Ivaldi & O'Neill, 2010). It might also be the case that some network actors remained in the shadow (as suggested by research on persons in the shadow), and yet no research has been devoted to their roles during the acquisition of expertise.

In conclusion, a musician comes in contact with different kinds of network actors throughout the lifespan. Some are perceived as important only during particular phases of musical development, while others provide support throughout musical development. Some of these network actors might leave the individual's network at some point, while others enter it. Therefore, changes in the network are a relevant issue which needs to be addressed when researching social networks.

Change in networks

Social networks are subject to change because the composition of network actors and the relations within the network behave dynamically as time passes (Feld et al., 2007). To indicate change, it should be determined if a research object is dynamic or static and at least three time points should be used for measurements (Ployhart & Vandenberg, 2010). Different statistical models were introduced to capture the dynamics of social networks longitudinally (Snijders, 2005). He mentioned that these models are quite complex because the structures within the network depend on each other and often result from an untraceable history. Van Waes et al. (2015) used a simpler approach in their study by calculating change ratios and stability ratios to capture the dynamics and the stability of the network. In this case a dynamic social network means that many actors leave and/or enter the network between certain time points. A stable social network means that many network actors remain in the network constantly. In popular music, it could be assumed that both –

dynamic and/or stable – networks are present. There are musicians who play in the same band from their adolescence, but there are also musicians who are constantly changing their bands. This might have an impact on expertise development as well. A stable band network might mean that the musicians are well-rehearsed, while a dynamic band network might bring the musicians in contact with other musicians with different musical backgrounds and contribute to the expansion of their musical knowledge.

With regard to change, a meta-analysis by Wrzus et al. (2013) suggested that the network size of an individual increases during early adolescence and adulthood, followed by a plateau until the 30s and a steady decrease through adulthood. They state that these patterns converge with socio-emotional selectivity theory and social convoy theory: During adolescence social networks might be necessary to satisfy informational goals, while during adulthood peripheral relationships are terminated because a focus on pleasant relationships is set to satisfy emotional goals, which leads to a decrease in the network size. Certain life events play a major role for these patterns. They cause changing circumstances which lead to a need to adapt to one's own social relations. These assumptions might also be true for popular musicians, but no research has been devoted to identifying patterns of change during expertise development.

A focus of research on expertise is to assess the growth (or the decline) of skills over time with the focus on interindividual change (e.g., ranking of chess players) or intra-individual change (e.g., transition from novice to expert) (Ackerman & Beier, 2018). Change is reflected in an improvement in human performance across many domains throughout the decades, so that the development of expertise can rarely be attributed to evolutionary changes, but rather to changes in practice driven by social networks (Lehmann & Ericsson, 1997; Lehmann & Kristensen, 2014). Lehmann and Ericsson (1998) found that sonatas composed in later periods were rated as more difficult than sonatas from earlier periods and that piano prodigies were able to play these pieces in younger ages than their predecessors. They mentioned that these improvements in the level of music performance can be explained by improvements in training, which is supported by network actors. Hence, the further development of a network supporting the learning of such pieces was also required to provide the necessary practice support and develop expertise in music. From the perspective of talent development, Ziegler (2005) argues that talents emerge and disappear with changes in the social environment. Therefore, a learning environment needs to change completely when it can no longer expand one's action repertoire and the interactions are no longer conducive to learning. Investigations of this phenomenon would

demonstrate that talent must be something more than just personal attributes and ensure that a constant growth of skills is possible, which leads to expertise in a domain.

To conclude, social network analysis seems to be an appropriate method to investigate the dynamics in social networks, in order to uncover how the composition of network actors and their support for practice changes during different phases of the acquisition of expertise. Change seems to be indispensable when social network support for the development of expertise is researched and should be considered as a relevant factor in the organisation of music practice.

2.2 Organisation of practice in music

Music practice can be organised in different ways, and differences in the preference for certain types of practice exist between music genres (Creech et al., 2008; de Bézenac & Swindells, 2009). While classical musicians prioritise solitary practice, jazz, pop, and folk musicians prefer to engage in collective practice with their peers (Creech et al., 2008; Lehmann et al., 2018). In classical music, solitary practice might be predominant because individual skills, e.g., sight-reading, need to be mastered; jazz, pop, or folk musicians might learn preferably in social contexts, because autonomous participation and experimentation in a band context need to be developed to become a professional (de Bézenac & Swindells, 2009). That said, solitary and collective settings are distinct learning settings, both of which can be supported by actors from the social network.

Independent from preferences of the genres, musicians might spend most of their time practising on their own and without the physical presence of other people, because these people simply cannot be present to provide constant support. The framework of transformative music engagement acknowledges musicians as active agents of their own learning, but also accepts that the musician is part of a complex sociocultural web and the engagement in music learning is strongly dependent on these relations to network actors (O'Neill, 2012). Nevertheless, musicians need to learn how to self-schedule music practice because practising alone is highly relevant to success (McPherson & McCormick, 2006). Practising solitarily has benefits for musicians because it might be easier to keep up concentration during the learning process when there is no distraction by others. For example, the memory performance of vocalists was worse when individuals learned in groups than when they learned on their own (Brandler & Peynircioglu, 2015). However, solitary practice does not mean that the practitioner is completely isolated outside a specific practice session – quite the opposite. Multiple perspectives suggest that practitioners benefit from being embedded in a community even when practising in solitude. Nielsen

(2004) and Jørgensen (2004) mentioned distinct types of learning strategies for solitary practice, which include (among others) planning, preparation, and evaluation strategies. These learning strategies might not be applicable to young musicians without the support of their social network, because they might not be able to set appropriate learning goals and structure their practice by themselves. Besides these strategies, autonomy is one of the most important skills musicians need to develop (Hallam & Bautista, 2012) and it can be supported by, for example, educators (Bonneville-Roussy et al., 2013). The same counts for intrinsic motivation, for which further research was suggested to investigate the interaction of personal traits (from a genetical perspective) and the environment (Appelgreen et al., 2019).

Musicians also practise collectively, especially when their music making involves other musicians like band or orchestra members, or when practising in a group of peers with the support of a teacher or mentor. In popular music, band practice, as a form of collective practice, is needed in order that the band be well-rehearsed and that all song parts merge fluently. Hakkarainen et al. (2004) state that collective practice is embedded in social structures and goes beyond individual learning achievements, so it should not be reduced to the sum of individual learning. This is especially true for popular music when it is performed in bands, because rather than the individual, the band as a whole is judged for its performance. Gaggioli et al. (2017) found that flow in music bands depends on group structures and specific interpersonal coordination patterns, like the exchange of gazes. Collective settings fostered a sense of shared responsibility; the development of instrumental technique; expressivity and communication (Schiavio et al., 2019); knowledge sharing and feedback (Hanken, 2016); a sense of belonging, motivation, and self-efficacy (Nielsen et al., 2018); the creation of value; the refinement of music skills; and the enhancement of the performance of music students (Forbes, 2020). Such collaborative and social learning contexts are characterized by fast-moving changes in the network and are associated with processes of developing new knowledge and innovations (Gaunt & Westerlund, 2013). The band context has an advantage in that the individual members can work together on songs and be innovative, because each musician in a band might have a different musical background contributing to the development of new music pieces. In addition, a single musician might be able to play or to compose music on all instruments in a band and the band members need to work together on songs.

Certainly, the organisation of practice might either depend on learning goals or be just a matter of taste. Solitary practice might be beneficial when a musician wants to focus on

certain skills or work on difficult parts of a song, because these require a certain amount of time until they are mastered. Collective practice seems to be beneficial when a group wants to perform as a whole and certain parts of a song need to be coordinated with others. Instead of being mutually exclusive, both types of practice are needed to be successful as musician and to further develop musical skills.

In conclusion, musicians need to have a supportive social network for both types of practice. Musicians are explicitly and implicitly supported by network actors (with or without their physical presence) to apply appropriate practice strategies in music learning on their way to acquiring expertise.

2.3 Expertise and deliberate practice in music

Acquiring expertise is in great demand in various domains. Important decisions are often based on the suggestions or assessments of experts because they are perceived to have the relevant knowledge to come to well-informed conclusions. Expertise in music can be explained by experts having made the necessary cognitive, physiological, and perceptual-motor adaptations to perform complex pieces flawlessly (Lehmann et al., 2018). However, different theoretical perspectives on expertise exist and determining “who is an expert” is complex. Theories focus either on the cognitive development of the individual or on the social environment forming expertise through socialisation. Recent theoretical frameworks combine both perspectives. A long period of time is needed to develop expertise and different theoretical models have tried to organise this development into different phases (or stages). During these phases, an individual needs to practise the relevant content to acquire expertise. Deliberate practice was accounted as one of the keys to becoming an expert (Ericsson et al., 1993). Since its determination by Ericsson et al. (1993), many researchers have examined deliberate practice in various domains and have found different aspects which constitute deliberate practice.

Theoretical perspectives on expertise – cognitive vs. social

To find an encompassing definition of expertise is challenging, because different research traditions have diverging views on what constitutes expertise and how it can be defined.

In psychology, researchers focus on how practice forms e.g., the individual’s mental capacities, domain-specific experience, representation and organisation of knowledge, or superior skills which must be attained in order to be recognised as an expert in a certain domain (Ericsson et al., 2007; Ericsson, 2018). Such cognitive adaptations of experts have

been investigated for over half a century in research focussing on changes in cognitive, physiological, or perceptual motor-skills due to the acquisition of expertise (Gruber et al., 2010; Lehmann et al., 2018). Domain-specific research focussed e.g., on changes in the neural processes in the brain of music experts (Cantou et al., 2018). In studies of such mental, motor, or cognitive processes, inter- or intra-individual changes stand in the foreground. To study the impact of social networks on changes of such cognitive processes seems too difficult, because their direct impact might not be observable. Nevertheless, those cognitive and/or physiological adaptations are acquired through extensive training (Lehmann & Ericsson, 1997), which needs the support of network actors. In addition, because cognitive resources are limited, collective actions in a network are needed in order to allow specialisation, the division of labour, and the sharing of knowledge leading to qualitatively stronger creative products (Hakkarainen, 2013).

Taking a sociological perspective, expertise can be understood as a capacity or property acquired through socialisation and participation in the practices of relevant social groups (Collins & Evans, 2018). Hallam and Bautista (2012) explained that learning music is a natural process through enculturation shared across cultures, which has already begun in the womb and continues through infancy, long before the start of formal tuition. Thus, the prerequisites of the development of musical expertise are already set through the implicit occupation with the social environment. In their framework on networked expertise, Hakkarainen et al. (2004) explain that expertise should no longer be described as the skill of a single individual, but instead as collaborative expertise in networks, where cognition and capability can be socially shared. By using the term “networked expertise”, the authors explain that higher-level cognitive competencies arise, and appropriate environments are needed to solve problems collaboratively and build knowledge together.

Newer theoretical models, such as the multifactorial gene-environment model (Ullén et al., 2016), have considered both the cognitive and sociological perspectives. In this model, deliberate practice is not taken as the sole condition for expertise, but also factors like opportunity (e.g., nationality, birth date), basic ability factors (e.g., working memory capacity), personality factors (e.g., grit, passion, motivation), domain-relevant experience factors (e.g., work and play), and developmental factors (starting age), which are influenced by genes, the environment and the interaction of both. Another model by Boshuizen et al. (2020) focusses on the restructuring of knowledge through processing cases. The authors claimed that knowledge restructuring is common to all domains and seems to be a general trait for the acquisition of expertise. They also mentioned that,

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besides individual cognitive traits, the social network of the individual is strongly involved in the acquisition of expertise.

Overall, these theoretical considerations of expertise have a direct influence on the definition of who is an expert.

Who is an expert?

Different research traditions have diverging ideas and determining “who is an expert” depends on the domain in which it is researched. For example, Ericsson et al. (2007) defined an expert as a person who performs at an outstanding level in a particular domain and is able to reproduce the performance repeatedly. Besides that, experts have an extensive knowledge base coupled with comprehensive experience of performing or solving domain specific tasks. For music, this would mean that an expert is able to perform highly complex music pieces at the same performance level over and over again, so that no errors in the performance occur and the pieces are played fluently every time. In addition, an expert in music might be able to play music in the different styles of the different genres, not only by having acquired the necessary musical knowledge, but also having made the necessary physical adaptations to play, for example scales, faultlessly. Lehmann et al. (2018) defined an expert in music as an individual who has acquired a superior long-term retention of domain-related material through changes in cognitive, physiological, or perceptual-motor functioning. In this way, an expert is able to identify meaningful patterns, helping them to learn and solve problems faster by having a greater working memory capacity and drawing on prior knowledge (Hallam & Bautista, 2012). In music, this might help the experts to analyse problems with pieces at a deeper level, e.g., to focus particularly on the difficult parts on the song and perform them more accurately. These definitions of who is an expert draw theoretically from the cognitivist approach and focus on individual processes.

Research literature from the sociological perspective makes a distinction between expertise as “performance” and “property” (Collis & Evans, 2018). The authors explain that in the “performance” view expertise was attributed to certain persons (or organisations) by others from the social environment, whereas the “property” view sees expertise as something acquired through socialisation within social groups. It can therefore be stated that an expert is embedded in a social network and can be identified or nominated by peers who ascribe this person (or organisation) with expertise in a certain domain. Ericsson et al. (2007) mentioned peer-nominations as problematic, because research has

shown that experts who were identified by peers often perform at the same level as experienced people. It might also be problematic to rely only on peer-nominations in popular music. Music preferences strongly depend on a listener's personal tastes and being recognized as musician strongly depends on record sales or numbers of clicks on internet platforms. The ways to make music accessible for listeners and advertising record sales have become easier even for non-experienced musicians. Therefore, peers might attribute expertise to persons for having successfully marketed their own music and not for being an outstanding performer. Nevertheless, Ericsson et al. (1993) used a peer-nomination procedure by music professors to allocate the participants to different groups, assuming these professors to have the necessary knowledge to identify their best students. Moreover, graduation certificates from music school or conservatoires, which account individuals to have acquired expertise to become a professional musician, are depended on the assessment of others, too.

Overall, both theoretical perspectives should be taken into consideration in order to define an expert and to understand how expertise develops during different phases.

Phases of expertise development

A lifespan perspective of performers across different developmental phases is needed in order to study the acquisition of expertise (Ericsson & Charness, 1994). This provides an opportunity for researchers to identify effective improvements through deliberate practice and describe changes in different aspects of performance longitudinally (Ericsson, 2016). Therefore, different developmental phase models were introduced, focussing on those general pathways of expertise development and/or skill development which are required in order to be recognized as expert.

For example, Fitts and Posner (1967) organised skill development into three phases. First, there is a cognitive phase, in which learning is under cognitive control and component parts of the skill are identified and developed leading to the formation of a mental image. Second, in the associative phase, the component parts of the skill are combined into an action, which becomes more fluent over time through continuous practising and feedback. Third, in the autonomous phase, the skill becomes automated and no longer requires conscious thought. Hallam (1998) drew up a list of important skills required for different tasks of the music profession comprising a combination of musicianship, aural, cognitive, technical, performance, learning, and life skills. These models focussed on skills that are

relevant to becoming an expert, rather than reflecting general pathways of expert development.

For example, Bloom (1985) suggested that musicians undergo three phases in the development of expertise. In the first phase, an individual is introduced to relevant activities within the domain, often through interaction with their social network or environment. In the second phase, the individual engages with formal instruction through support by teachers or others who are more knowledgeable in the domain. In the third phase, the individual develops a full-time commitment to music and starts a career as professional. Ericsson et al. (1993) added a fourth phase to this model, in which the individual goes beyond the already accumulated knowledge in the domain to make an innovative contribution. Another model by Manturzewska (1990) suggested six phases across the lifespan of musicians. The model comprises an unprompted expression and activity in the domain, intentional and formally guided musical activity, the foundation of an artistic personality, establishment within the music profession, a teaching phase, and a withdrawal from professional activity. Papageorgi et al.'s (2009) model summarised these different perspectives of general pathways expertise development and skill acquisition into a single model with seven stages, reaching from the introduction to the withdrawal from the instrument.

All these models highlight the role of (deliberate) practice, which is explicitly or implicitly related to support by social network actors, especially those phases which require formal tuition and feedback from others.

Deliberate practice

In their study on violinists, Ericsson et al. (1993) introduced the concept of deliberate practice as a key to attaining the highest levels of performance. In their original definition the authors mentioned (besides other aspects) that deliberate practice is a goal-oriented and structured training activity. It needs the motivation of the individual to effortfully improve its performance, immediate feedback with a diagnosis of errors on the tasks performed by teachers, and learning content designed to improve the current knowledge level. Since the publication of this article, deliberate practice has been examined in various domains and has served as a key indicator to analyse expertise development. In their meta-analysis, Platz et al. (2014) confirmed the role of deliberate practice as a key to understand exceptional performance. Ericsson et al. (2007) defined deliberate practice as a special kind of practice activity that differs from sheer experience and is not inherently enjoyable like playfully

engaging with domain-relevant content. Therefore, performers should concentrate on practice activities especially designed to change and refine particular mediating mechanisms to attain exceptional performance levels. Recently, Ericsson (2016, 2020) defined five key aspects of deliberate practice: 1) clearly defined goals which are understood by the trainee, 2) the ability of a trainee to perform the task by themselves, 3) immediate informative and actionable feedback to improve, 4) the possibility of repeatedly performing the same task, and 5) individualised instruction and guidance by a teacher. All of these can be directly supported by network actors.

Nevertheless, criticism arose regarding the role and nature of deliberate practice (Hambrick et al., 2016; Macnamara et al., 2014, 2016). One of the main criticisms by Macnamara et al. (2014) was that teachers alone are regarded as fundamental for designing deliberate practice, while in other definitions “external agents, such as teacher or trainers” (Ericsson, 1998, p. 136) are mentioned. This neglects the role of other network actors like peers, who are proposed to be the main supporters of popular music practice (Lebler, 2008). Hence, other network actors might also contribute to deliberate practice and take the supportive role in music practice, which is granted by Ericsson (2016) to teachers exclusively.

Therefore, this dissertation focusses on the social networks of popular musicians and their support for deliberate practice, which is defined by the following attributes: 1) goal-setting, 2) the structuring of learning content, 3) feedback, 4) error correction, 5) motivation, and 6) improving previous knowledge through learning content.

In conclusion, the theoretical framework of the current dissertation provides an understanding of the role of social networks in music practice, the organisation of music practice, and expertise development. An application of this framework leads to the impression that different network actors are involved in the support of popular musicians in their deliberate practice. An investigation could provide a more detailed overview of how actors form the social networks of popular musicians contributing to their practice during the development of expertise. Three research gaps were identified and will be addressed in this dissertation:

- 1) Different terms are used to describe networks of musicians, but research has neglected to systematically assess which network actors are exactly supporting practice during different phases of expertise development (Study 1).

- 2) Practice seems to be a key to achieving expertise. Deliberate practice, exhibiting specific features, was found as most relevant in this regard. Research has not assessed

which network actors and how these network actors provide support for practice in general and for certain aspects of deliberate practice during phases of expertise development (Study 1 and Study 2).

3) Network actors and their support constantly changes during different phases of expertise development. Research has not addressed change in networks as a relevant factor during phases of expertise development (Study 3).

2. Aims of the thesis, publication strategy and overview of the studies

3.1 How do social networks support practice in popular music?

Based on the identified research gaps, this dissertation aims to investigate the role of social networks in the support for popular musicians' practice, and thereby contribute to the acquisition of expertise. Therefore, three sub-ordinate aims were posed:

Aim 1 – How are networks that support the practice of popular musicians during different developmental phases of expertise composed?

Although the support for practice by network actors is essential during different phases of the acquisition of expertise, it has remained uncertain which network actors are actually present and support the individual musician. This problem is also addressed by research on persons in the shadow stating that network actors remain in the shadow of the expert and are often unrecognised. This knowledge gap is especially present in research on the popular music genre, as most research in music focusses on the classical music genre. Therefore, the aim was to investigate which network actors support popular musicians in their practice, in particular deliberate practice, during three phases of their musical development. To achieve this aim, Study 1 was conducted using a mixed-method egocentric network analysis. Identifying the relevant network actors could contribute to theoretical conceptualisations of the role of network actors during the acquisition of expertise and help to foster the future learning environments of popular musicians.

Aim 2 – How do network actors of popular musicians provide support for practice during different phases of expertise development?

Research literature has explained that large amounts of practice need to be devoted to a musical instrument to reach expertise. A specific form of practice to reach expertise is deliberate practice, which consists of different aspects. These aspects are goal-setting, structuring of learning content, providing motivation to practise, correcting errors, giving

feedback, and providing learning content that further expands knowledge. Each of these aspects can be supported by network actors who have accompanied the musician during different phases of expertise development. Peers, parents, and teachers have been identified as persons in the shadow who have built a network which provides support for musical practice. Following the idea of persons in the shadow, it seemed possible that other network actors, too, might support practice during the development of musical expertise. There is a considerable gap in research linking the support for music practice to specific network actors in different phases of expertise development. Therefore, it was aimed to investigate how network actors support practice and the different aspects of deliberate practice during phases of expertise development. As this aim was too extensive for one study, two studies (Study 1 and Study 2) were conducted. Study 1 is a mixed-method egocentric network study with popular musicians playing different instrument. It focussed on different aspects of deliberate practice supported by network actors. This was a novel approach to research into the supportive role of network actors in music. Study 2 is a case study with a narrower focus on the general role of persons in the shadow (defined as peers, parents, and teachers) during practice of popular music guitarists. Guitarist were used as an exemplary group of popular musicians. The results of both studies might contribute to a deeper theoretical understanding on how support for practice is provided and how learning environments can be fostered.

Aim 3 – How do networks supporting practice of popular musicians change during different phases of expertise development?

The acquisition of expertise is a process which requires large amounts of time stretching from childhood to adulthood. It seems obvious that networks supporting deliberate practice during this process of expertise development change over time. These changes in the network might directly affect the support for deliberate practice and hence the acquisition of expertise. There is a considerable gap in research investigating the change in networks supporting musicians in their deliberate practice during expertise development. Therefore, the aim was to investigate the dynamic nature of networks and examine if there are differences between intermediate and expert musicians with regard to these changes. Therefore, data from Study 1 were used and stability ratios and change ratios of the networks were calculated. To achieve this aim, Study 3, using egocentric network analysis, was conducted. The results contribute to a theoretical discussion about change in networks and offer possibilities to analyse change in networks.

3.2 Investigation and publication strategy

The theoretical assumptions of this dissertation (presented in Chapter 2) follow a certain order to provide the reader with an overview of how each theoretical block builds on each other and how research gaps were uncovered. The theoretical framework, as presented in the current dissertation, was developed during the process of conducting the studies. Therefore, the date of publication of the studies follows a different chronological order than the theoretical part might suggest. To provide a different perspective of how the ideas of this dissertation developed, this chapter aims to provide an overview which investigation and publication strategies were applied for the studies chronologically.

The starting point of this dissertation was the concept of persons in the shadow and their role during expertise development. During this time, the notion was relatively new to the field and only a few studies focussed on this topic. In my master's thesis, I aimed to investigate the role of persons in the shadow for the self-efficacy of musicians. Therefore, a mixed-method design was applied using a questionnaire and a semi-structured interview. The focus of both instruments was on peers, parents and teachers, because research mentioned them as persons in the shadow and for being the main supporters during musical practice. The questionnaire examined the self-efficacy of the participants and the role of peers, parents and teachers for self-efficacy development. The interviews mainly focussed on a time component (e.g., how long did you have guitar lessons?) and the role of peers, parents, and teachers during practice and for motivation to practise. The interview data, in particular, contained rich information about the role of peers, parents, and teachers during the musical development of guitarists. Publishing an article on this topic in a scientific journal (Study 2) seemed useful for other researchers, because no research on this specific topic had been published at that time. A research journal with focus on music (*Musicae Scientiae*) was chosen for publication, because the study was anchored in the domain of music. Therefore, the interviews with nine guitarists (three experts, three sub-experts, three amateurs) were re-analysed with a deeper focus on how persons in the shadow (defined as peers, parents, and teachers) support practising, learning, and motivation. During data analysis it became obvious that also other people were involved in the practice processes of the guitarists. Following these impressions, the research idea arose that the focus of future research should shift from these particular three groups within persons in the shadow to a more detailed investigation of which persons exactly accompany and guide the acquisition of expertise of musicians during their life span. The concept of social networks provided a solid theoretical basis and social network analysis was found to be a suitable

tool for structured and detailed investigations of this topic. The support from network actors for distinct aspects of deliberate practice during different phases of expertise development was identified as a research gap, because a social networks perspective has barely been applied in expertise and music research. In the initial phase of data collection using social network analysis, different research designs were tried out, mainly aiming to collect quantitative network data with questionnaires. Analysing this type of data failed the research aims in four ways: 1) answer options during name-generation (which means the collection of network actors' names) needed to be limited to 20 persons, 2) almost no data could be collected on how network actors support deliberate practice, 3) inaccurate answers were given, and 4) the rate of responses to the questionnaire study was too low to have reliable results. Consequently, the research design was changed to the use of qualitative interviews in combination with network visualisations and a demographic questionnaire to gain deeper insights into the relations between network actors and the individual musician. During the interview process it was decided to publish the article in *Musicae Scientiae* (Study 1) again, because the research was once more anchored in the domain of music, and the results were seemingly relevant for the readership and scope of this journal. Interview data was collected from experts and intermediates in popular music and in classical music. When analysing the interview data, it became apparent at a very early stage that a publication containing data from both popular and classical musicians would not be possible due to word limitations. For this reason, it was decided to focus on popular musicians, because less research in this field exists. The analysis of data from popular musicians left the impression that change in networks between certain phases of expertise development (Study 3) is an underlying topic and research in music about this topic does not exist. After a search for analysis methods for change in social networks, the interview data was re-analysed according to these suggestions. It was decided to publish the results as a paper in *Psychology of Music*, because the focus of the journal is still on music and would allow me to gain new experiences in publishing in a different journal.

To sum up, the following three papers built the basis of this dissertation. A fourth paper with a narrower focus on deliberate practice comparing experts in classical and popular music is being prepared alongside this dissertation.

3.3 Overview of the studies

To achieve the aims, three related studies were conducted. These studies were published in peer-reviewed journals and are presented in the following chapters.

Study 1 – Quality of network support for deliberate practice of popular musicians

Network actors are crucial in the support of the individual's musical practice during phases of expertise development, but less is known about who network actors are and how they support deliberate practice. Research literature mentions six aspects of deliberate practice that lead to success. These are goal-setting, structuring of learning content, providing motivation to practise, correcting errors, giving feedback, and providing learning content that expands knowledge. Various network actors might support these different aspects of deliberate practice over time. Research investigating which network actors and how network actors support these six aspects of deliberate practice across different phases of expertise development is rare. To reach this aim a mixed-method egocentric network study was used to investigate and compare which network actors and how these network actors supported deliberate practice of popular musicians ($n = 10$, five experts and five intermediates) during three phases of expertise development. The mixed-method egocentric network analysis was used to focus on the network actors from the perspective of an individual musician (called "ego"). Attributional data about the "ego" was collected by a questionnaire. Attributional and qualitative data about the relations to network actors was collected by an interview in combination with network visualisations. The research questions of this study were 1) *Which network actors supported the deliberate practice of expert and intermediate-level popular musicians?* 2) *What kinds of support for deliberate practice did expert and intermediate-level popular musicians receive from network actors?* 3) *What are the differences between the kinds of support for deliberate practice that were perceived by expert and intermediate-level popular musicians respectively?* The results revealed that various network actors (primarily band members and instrumental teachers) supported popular musicians during the acquisition of expertise and changed their support role over time. The support by network actors differed between experts and intermediate musicians regarding which network actors were perceived as important during particular developmental phases and in the support for various aspects of deliberate practice. Finally, the data gathered in this study was used to investigate changes in the networks in Study 3.

Study 2 – Peers, parents, teachers: A case study on how popular music guitarists perceive support for expertise development from "persons in the shadows"

According to research literature, "persons in the shadow" form a network which is accounted as being mainly supportive for expertise development of popular musicians (Gruber et al., 2008; Lehmann & Kristensen, 2014). Such persons in the shadow might be

peers, parents, or teachers. As the support for expertise development and the networks providing this support might differ in terms of the instruments that are practiced and the music genre played, this study focussed on guitarists performing popular music ($n = 9$, three expert, three sub-experts, three amateurs). The aim of this study was to investigate how the support from persons in the shadows (peers, parents, teachers) during expertise development is perceived by guitarists at three different professional levels (expert, sub-expert, amateur) during the careers. Three research questions were investigated: 1) *How do expert, sub-expert and amateur guitarists differ in their description of the role of peer support for the development of expertise?*, 2) *How do expert, sub-expert and amateur guitarists differ in their description of the role of parental support for the development of expertise?*, 3) *How do expert, sub-expert and amateur guitarists differ in their description of the role of teacher support for the development of expertise?* The results provided insights on the learning environments of popular music guitarists and unravelled the role of peers, parents, and teachers during the development of expertise. This might help to foster future practice environments for guitarists who want to reach an expert level.

Study 3 – Exploring change in networks supporting the deliberate practice of popular musicians

Considering time as a relevant factor during the acquisition of expertise, change in the networks supporting deliberate practice needs to be considered as present. Because change in networks might directly affect by whom and how musicians are supported on their way to become experts. A deeper understanding of such change is crucial to the understanding of how networks themselves offer support. The aim of Study 3 was to investigate changes in the overall networks and each network supporting different aspects of deliberate practice of popular musicians during three phases of expertise development. The research questions in Study 3 investigated were: 1) *To what extent does the overall number of network actors that support the practice of expert and intermediate popular musicians change during the three developmental phases?* 2) *To what extent does the number of network actors that support different aspects of the deliberate practice of expert and intermediate popular musicians change during the three developmental phases?* To address these research questions, data from Study 1 ($n = 10$, five experts and five intermediates) was used. The results indicated how changes in the network differ in stability or dynamism between experts and intermediates during phases of expertise development. This study might help foster learning networks which provide support for these six aspects of deliberate practice.

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4. Study 1:
**Quality of network support for deliberate practice of popular
musicians**

Full text available at

<https://journals.sagepub.com/doi/10.1177/1029864920938451>

Längler, M., Nivala, M., Brouwer, J., & Gruber, H. (2022). Quality of network support for deliberate practice of popular musicians. *Musicae Scientiae*, 26(1), 185–207.
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5. Study 2:

Peers, parents, teachers: A case study on how popular music guitarists perceive support for expertise development from „persons in the shadows“

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Längler, M., Nivala, M., & Gruber, H. (2018). Peers, parents, teachers: A case study on how popular music guitarists perceive support for expertise development from „persons in the shadows“. *Musicae Scientiae*, 22(2), 224–243.
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6. Study 3:

Exploring change in networks supporting the deliberate practice of popular musicians

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7. Key findings

The overarching aim of this dissertation was to investigate how social networks support practice of popular musicians, and thereby contribute to the acquisition of expertise. To reach this aim three subordinate aims were posed: 1) How are networks that support the practice of popular musicians during different developmental phases of expertise composed? 2) How do network actors of popular musicians provide support for practice during different phases of expertise development? 3) How do networks supporting practice of popular musicians change during different phases of expertise development? The key findings of the three studies, which were conducted to reach these aims, are presented in this chapter.

1) How are networks that support the practice of popular musicians during different developmental phases of expertise composed?

Study 1 was conducted to answer this question. A mixed-method egocentric network analysis was used to analyse the social networks of five expert and five intermediate popular musicians. An overview of all network actors which were perceived as offering support to expert and intermediate popular musicians during their childhood, apprenticeship, and career can be found in Table 3 of Study 1.

Analysis revealed that a majority of experts were supported by instrumental teachers and/or mentors, band members, peers in the music community, and idols during their practice in childhood. Most intermediates reported that their parents, family members, instrumental teachers, band members, peers in the music community, and idols were supportive for their practice during childhood. During the period of apprenticeship, a majority of experts reported that instrumental teachers and/or mentors, band members, classmates at the conservatory, and idols had supported their practice. Most intermediates referred to band members and peers from their music community as supportive. A majority of experts mentioned band members and their record producer as supportive of their practice during the career phase, whereas most intermediates mentioned their band members and peers from the music community.

To conclude, both experts and intermediates mentioned band members as the most relevant group through all phases of expertise development. Experts recalled the presence of supportive instrumental teachers during both childhood and apprenticeship, while intermediates found them relevant only during childhood. In contrast to the intermediates, a majority of experts had musical mentors supporting their practice during their childhood

and apprenticeship, in addition to their instrumental teachers. A majority in both groups mentioned idols and peers from the music scene as present during childhood. Support by parents played only a minor role in the expert group, while they were mentioned by intermediates as more relevant, at least during childhood.

2) How do network actors of popular musicians provide support for practice during different phases of expertise development?

Studies 1 and 2 both addressed this question. Study 1 focussed on the support for six aspects of deliberate practice by network actors by five expert and five intermediate popular musicians during three phases of expertise development. Interviews and network visualisations were used to collect data on their egocentric networks. The six aspects of deliberate practice were goal-setting, structuring of learning content, feedback, error correction, motivation, and providing learning content improving previous knowledge. Study 2 focussed on the role of peers, parents, and teachers during general practice by three expert, three intermediate, and three amateur guitarists. Semi-structured interviews were used for data collection. A detailed overview of the systems of categories which resulted from both studies can be found in Table 2 of Study 1 and Table 5 of Study 2.

The analysis of expert and intermediate musicians showed that peers (predominantly band members and peers from the music scene) set goals for song learning, supported them by structuring songs, showed them songs from unfamiliar genres, provided constructive support to correct errors during performance, and provided extrinsic motivation for practice during childhood. Members of expert musicians' bands provided constructive feedback, while the intermediates described their feedback as encouraging. During apprenticeship, a majority of expert musicians reported that peers (predominantly band members and classmates) set goals to practise songs and content from unfamiliar genres. Peers provided constructive feedback and a constructive correction of errors, motivated them to practise, and provided new content in form of songs, sometimes by watching them or jamming with them. During the career phase, both experts and intermediates were supported by their peers (predominantly band members). For a majority of experts, peers helped by setting goals and helped to structure songs and own compositions. Peers also provided motivation, constructive feedback, a constructive correction of errors, and error correction through listening to their own recordings of songs. For most intermediates, peers set goals and structured the song learning and composition processes. They provided constructive feedback and a constructive correction of errors, motivation to practise, and new learning

content in form of songs or through jamming with them. Similar results were found in the network study of the guitarists. Peers were perceived as the most relevant group for the musical career of guitarists. They were found to have awakened guitarists' interest in the instrument and encouraged them to start practising. All experts in this study reported that they had no teacher but were instructed by their peers during their childhood. Therefore, peers (especially band members) were an important source for the exchange of musical knowledge. Peers enhanced their motivation to practise by making practice more purposeful and directing it when playing together in a band.

Experts reported that their instrumental teachers and/or mentors set them goals and structured musical exercises, provided new content expanding their musical knowledge, and provided a constructive correction of errors during childhood. In contrast to the intermediates, the experts received encouraging and constructive feedback from their instrumental teachers and mentors. During the apprenticeship phase, the expert musicians entered conservatoire or music school and received support from instrumental teachers. A majority of experts reported that their instrumental teachers had set goals to learn exercises, songs, and content from unfamiliar genres. They structured the exercises and songs to practise, provided constructive feedback and a constructive correction of errors, motivated them to practise, and provided new content in the form of exercises and songs. In contrast, only one intermediate musician had taken lessons from a private instrumental teacher, who fostered his learning and encouraged him to practise. During career, instrumental teachers played a minor role for the musicians. Some experts reported occasionally visiting master classes offered by other experts playing the same instrument. The guitarists viewed role of teachers as ambivalent. In contrast to the intermediates and amateurs, the expert guitarists did not start lessons until their adolescence. The expert guitarists mentioned that their own motivation was more relevant for them than being motivated by teachers. Although all groups had a largely positive relationship to their teachers, some participants reported negative experiences.

Family members (primarily parents) were involved in the practice of a majority of intermediates, providing motivation and feedback, but only a minority of the expert musicians reported such family involvement. This pattern continued through the apprenticeship phase, but by the career phase, support by parents was seen as no longer relevant. The guitarists' parents were mentioned by all groups as providing a musical household. This can be seen as a kind of starting point for their musical practice along with peer introduction to the instrument. If the parents were involved in music learning, they

were described as having encouraged rather than forced the majority of guitarists to practise. Some expert guitarists had a discouraging experience and limited acceptance by their parents of their musical ambitions, despite later support when the seriousness of their career intentions became clear.

Idols were mentioned as important for the goal setting of the experts during the childhood and career phases. Record producers were mentioned as having provided constructive feedback during recording sessions by a majority of experts during the career phase.

3) How do networks supporting practice of popular musicians change during different phases of expertise development?

Study 3 addressed this question. Data from the expert and intermediate musicians of Study 1 was re-analysed by using change ratios and stability ratios to indicate change in networks supporting six aspects of deliberate practice during three phases of expertise development. The six aspects were goal-setting, structuring of learning content, feedback, error correction, motivation, and providing learning content improving previous knowledge.

On the whole, experts' support networks were less stable and changed more between all three developmental phases when compared to those of intermediates. The same results were found for networks of experts supporting goal-setting, feedback, correction of errors, and motivation. The networks which supported the structuring of content showed in both groups a low stability and high change ratio between childhood and apprenticeship. Between apprenticeship and career, the experts' networks showed a lower stability ratio and marginally lower change ratio when compared to intermediates' networks. In both groups, the networks providing new content showed low stability ratios and high change ratios between all three developmental phases.

In total, the networks supporting experts contained a larger number of network actors than those of intermediates during all three developmental phases. The same result was found for all six aspects of deliberate practice, the largest differences appearing in providing goal setting and new content during childhood, and for goal setting and structuring content during apprenticeship and career.

In total, the number of network actors supporting practice decreased in both groups over time, with a precipitous drop between the childhood and apprenticeship phases. A similar pattern was found for networks supporting goal-setting of the experts. The number of network actors providing support for structuring content of experts fell less sharply. A

linear decrease was noticed in networks supporting goal-setting among intermediates, as well as those providing feedback for both groups. The number of network actors structuring content for the intermediates stayed the same during apprenticeship and career of intermediates. Error correction networks remained stable for experts and increased for intermediates between the apprenticeship and career phases, as did the number of network actors providing motivation for the experts. The number of network actors providing new learning content decreased in both groups.

In summary, the results of all three studies revealed that a variety of network actors were present during three phases of expertise development. They provided support for different aspects of deliberate practice and music practice in general. The support and the composition of the networks changed over time, while experts had more network actors present during their practice. Overall, differences in terms of network composition, support for practice and change in the networks were found between expert, intermediate and amateur musicians. The findings have implications for future research and will be discussed in the following chapter.

8. Discussion

The results presented in the current dissertation show that various network actors were perceived as supportive for the practice of popular musicians during different phases of expertise development. These network actors supported practice in general as well as different aspects of deliberate practice. Networks of expert popular musicians changed more across time, which might have contributed to the development of their expertise. The following discussion focusses on the three research aims and provides implication for future research.

8.1 Composition of networks supporting practice in popular music

Various network actors were found to be supportive of popular musicians in their practice during different phases of expertise development. This relates to the findings and theoretical assumptions that a strong social environment is needed to support musicians to acquire expertise (Kenny, 2016; Moore et al., 2003). Four major groups of network actors could be identified: peers (including band members, peers from the music community, and classmates), teachers (including instrumental teachers, mentors, school music teachers, and workshop leaders), family (particularly parents), and others (including DJs, idols, internet channels, instructional books, and producers). This confirms and extends findings by Hallam (2011), who mentioned parents, teachers, and peers as the main supporters of musical practice.

Peers, in particular band members, were mentioned as the most present and most important group by expert, intermediate, and amateur musicians during their childhood, apprenticeship, and career. The current results confirm findings by Lebler (2008) or Green (2002) who explained that peers rather than teachers supported the practice of young musicians in popular music. Being involved in or merely aware of such musical peer groups seemed to foster musical ambitions, motivating young people to take up an instrument and engage in practice. This finding closely relates to the ideas of Kenny (2016) that musicians form communities of practice which could result in the development of music scenes. The current study did not explicitly focus on communities of practice but does imply that the formation of such communities is beneficial for the practice of musicians in popular music. Popular musicians preferred collective practice settings with their peers, where the support is reported to be provided rather informally. This was also found by de Bézenac and Swindells (2009). However, the results of the current dissertation imply that peer support might not be as informal as is often mentioned in research. Peers were well able to provide

support for the same aspects of deliberate practice as teachers. The finding that the expert guitarists in Study 2 had no instrumental teacher until their adolescence, but instead structured their learning content themselves or with the support of older peers, supports this claim. A reason for this finding might be that these experts started playing popular music in a time when no formalised structure for practising existed in music schools. Vitale (2011) also noted that popular musicians engaged in a large number of unstructured learning scenarios with other musicians, which he terms “garage band scenarios” (p. 2). As an example, he mentioned The Beatles, who became arguably one of the most successful bands in the world without formal support by teachers. That said, it is possible to gain the basic musical knowledge to be able to engage in music-making in bands, to be admitted to conservatoire, or even become a member of one of the most famous bands in the world without being instructed by a teacher.

However, the role of teachers in music popular practice should not be downplayed. The results revealed that a majority of the popular musicians were instructed by teachers, chiefly instrumental teachers, during childhood and apprenticeship. While the older musicians, who started playing popular music at the end of the 1960s, mostly had no teachers available to support their practice during childhood, the younger experts (and intermediates), who started around the 1980s, had already received popular music lessons from teachers. Though the intermediates and amateurs stopped taking lessons after childhood, almost all expert musicians received formal lessons in conservatories or pop academies during their apprenticeship. This vibrant learning community might have fostered the organisation of their individual and collective practice (de Bruin et al., 2020) and supported the acquisition of expertise of most experts. During their career, a small number of experts continued formal training through master classes. These findings might help explain why experts were able to further their musical knowledge and expertise, while the intermediate group stayed at an acceptable performance level. A role which was perceived similar to the role of teachers, is the role of mentors, who were mentioned by experts as supportive during childhood. These mentors (often older peers or parents of band members) had already acquired necessary knowledge in performing popular music and shared it with the young experts. Similar results were found by Gruber et al. (2008) in jazz, where most experts referred to mentors who fostered their abilities to become experts.

Parents and other family members seemed to play a minor role during practice, which might be difficult for parents who did not have any musical experience, although they are regarded as playing a key role for expertise development (Creech, 2016; Creech & Hallam,

2011). However, the results showed that some musicians did benefit from a musical household provided by their parents. Financial support in particular was crucial for young musicians to be able to afford an instrument or formal music lessons. Some parents seemed to have had a negative attitude towards their children aiming to enter a career as musicians, though this did not stop their children from eventually attending a conservatoire.

Idols seemed to play a relevant role for the musicians throughout their careers. For some musicians, their idols were a kind of starting point to engage in music learning. They often engaged in learning their idols' songs for fun at home or covering them with their band members. This required them to enhance their musical skill level to that of their idols. Some experts also described playing the songs of their idols during jam sessions in conservatories and trying to reach the same skill levels. These findings imply that covering the songs of idols is also relevant to the organisation of both solitary and collective practice. Anderson and Cavallaro (2002) described that children see a chance to emulate their role models and to possess the same skills, which provides guidance and shapes values and behaviours even into adulthood. Research into the role of idols in the development of adolescent musicians is scarce and could reveal valuable information regarding how persons, which are not personally in a network, are perceived for providing guidance during the acquisition of expertise.

In the career phase, music producers were mentioned by the experts as a relevant source for their musical practice. Producers are often responsible for the artistic direction of music pieces (Pras & Guastavino, 2011) and can be sometimes seen as an additional band member. Research on their role is limited and could provide interesting insights into how musicians are guided during the recording process.

With a focus on professionalisation rather than practice, it is likely that network actors of different kinds and in greater numbers would have been uncovered. Established musicians often need to work together with managers, booking agencies, or event managers over the course of their career. Due to the increasing impact of the internet and the difficulties with streaming portals, the networks of musicians are required to change into other directions. Therefore, new connections to other network actors, such as content managers or influencers, are likely needed to establish a professional career. None of these groups of network actors were found as important during the analysis of the data, though they undoubtedly play a role in the development of contemporary popular musicians.

Musicians are embedded in a large web of network actors during their lifespan. These network actors supported different aspects of deliberate practice and contributed to the

expertise development of popular musicians. Peers (principally band members) and teachers (principally instrumental teachers) were found to be the main supporters of popular musicians during practice. Nevertheless, although both of these groups of network actors supported the individual and collective practice of the musicians, collective practice with band members seems to be the preference in popular music. Teachers, however, maintain a role in providing the necessary support for solitary practice sessions and helping the musicians to constantly improve their musical skills. Social network analysis has proved itself useful as a tool to identify which network actors are relevant during the acquisition of musical expertise (or in other domains) and reveal the presence of network actors who might not have been perceived as relevant by research before.

8.2 How network actors support practice in popular music

The results revealed that various network actors provided different kinds of support for both the general and deliberate practice of popular musicians. This dissertation focussed on six aspects of successful deliberate practice (Ericsson, 2016, 2020): goal-setting, structuring of learning content, feedback, error correction, motivation, and providing learning content improving previous knowledge. Ericsson (2016) clearly stated that these aspects of deliberate practice must be supported by a teacher, while in earlier definitions, “external agents, such as teacher or trainers” (Keith & Ericsson, 2007; p. 136) were mentioned. This inconsistency was one of the main criticisms of Ericsson’s work, arguing that the definition of deliberate practice had changed since its introduction in 1993 (Macnamara et al. 2014, 2016). A reason for the claim by Ericsson (2016, 2020) that teachers must be the persons who design deliberate practice, might be that research on deliberate practice mainly focussed on domains with formal practice traditions, such as the classical music genre. The results of this research showed that not exclusively teachers, but also other network actors, in particular peers, could provide similar support for these aspects of deliberate practice in a genre such as popular music with its tradition of informal learning.

The results revealed that peers, and especially band members, were perceived as important for supporting all aspects of deliberate practice throughout different phases of expertise development. On the one hand, this contradicts findings by researchers who mentioned that the interaction with peers is mostly playful (Lehmann & Ericsson, 1997), and does necessarily not lead to the acquisition of expertise. On the other hand, this emphasises findings that popular musicians prefer informal and collective practice settings

with peer-directed learning (Green, 2002) and that peers are one of the main supporters of practice in popular music (Lebler, 2008). Research from other domains also reported positive effects of peer learning on the learning outcomes (Riese et al., 2012). The results showed that peers set goals and structured the learning of songs or for composing new material. They provided exercises to facilitate the performance of certain pieces during or while preparing for practice sessions. Previous research has shown that individuals who worked together with peers toward common goals were both more engaged and more willing to share information, leading to better performance outcomes (Moore et al., 2003). In addition, the findings of this dissertation show that peers provided feedback and supported the correction of performance errors during band practices or jam sessions. This was the case for experts and intermediates from childhood through to their career. For Ericsson (2016, 2020), immediate feedback and the correction of errors was one of the most important aspects of deliberate practice because they allow weaknesses to be uncovered and improved immediately. Based on the current results, collective contexts, like in bands, seemed to be ideal to provide instantaneous feedback and error correction, because the musicians can directly exchange ideas about their current work and repeatedly rehearse songs to perfection. If performance errors happen during more complex parts, feedback could serve as the basis for individual practice, too. Nevertheless, at least one band member needs to have acquired the necessary sense of hearing to be able to detect performance errors. The results also revealed that engaging in band projects or jamming with peers was perceived as motivating for popular musicians. This was found by Sichivitsa (2007), who describes peers as an important motivator for music practice by shaping musicians' values and attitudes towards music learning. Band members or other peers from the music community are involved in providing new learning content for the musicians. This might happen with a purpose, for example, if a band member needs to learn an unknown scale to be able to play an instrumental solo. Or it may happen incidentally, for example when jamming with peers who have another knowledge base. Overall, the results on peer support for deliberate practice suggested that they might play an important role for domains with informal learning traditions, and future research could set more focus on their role during practice.

As mentioned in the beginning of this chapter, the role of teachers is explicitly highlighted in the acquisition of expertise (Ericsson, 2016). The results of this study showed that most popular musicians received lessons by instrumental teachers during their childhood, but only the experts mentioned being instructed by teachers during their

apprenticeship in conservatories or pop music academies. Teachers were involved in all aspects of deliberate practice of the musicians. Most teachers set goals and structured learning exercises or songs in a way to enable a constant increase of musical knowledge. However, a few musicians were critical of some of their teachers for not being well-prepared for lessons, setting appropriate goals, or structuring the learning content. This was the case for instrumental teachers from childhood as well as for conservatoire teachers. Uncertainties about whether the teacher is the right person for musical progress impacted relationships with teachers and resulted in changing the teacher or even discontinuing lessons altogether. Former research showed that the relationship to the teacher has a significant influence on the output of their students (Creech & Hallam, 2010) and musicians need a supportive and enthusiastic teacher to develop motivation (Hallam, 1998). A majority of the musicians recalled being motivated by most of their instrumental teachers. However, some experts reported that their teachers at the conservatoire level were not motivating and they needed perseverance to make it through. This reflects the role of “dark” persons in the shadow, who are not perceived for their supportive but for their non-motivating, sometimes rude behaviour (Gruber et al., 2008; Lehmann & Kristensen, 2014). However, these dark persons in the shadow have an impact on the musicians’ practice, forcing them to persevere and overcome difficulties, which could lead to expertise. Similar results were found for feedback and error correction by teachers. A majority of the musicians reported that they received constructive feedback or constructive error correction by their teachers, which enabled them to work on their weaknesses. Mentors, too, were perceived as relevant for most aspects of deliberate practice. Lehmann and Kristensen (2014) mentioned that mentors might hold the secret for young musicians’ development, and indeed all experts mentioned having had a mentor during childhood. Mentors might even be more suited to the informal learning traditions in popular music as the role of instrumental teachers is perceived as rather formal (Vitale, 2011).

The role of family was not perceived as relevant for music practice as researched by, for instance, Creech (2016) or McPherson (2009). The results revealed that parents were perceived as providing encouraging feedback and motivation to practise, which is beneficial for early music-learning during childhood. Nevertheless, the experts mentioned above all their peers or teachers as being the relevant supporters of their musical practice. McPherson (2009) described a musical household as crucial for the early development of musical abilities. This was only weakly confirmed by the results. Some of the musicians grew up in a household with parents who were musicians or music teachers, but other

musicians neither had this kind of background at home nor did they perceive support from their parents. They developed a kind of intrinsic wish to learn an instrument, which probably arose from seeing their peers or idols perform music. Although parents who played an instrument could function as a role model for their child, it seemed that in popular music it was rather peers or idols who contributed to awakening an interest in the instrument. Other family members were barely mentioned as having an impact on the musical practice. One intermediate reported taking instrumental lessons with his brother, which was highly relevant for him, because they could exchange ideas and monitor practice together.

Besides these three major groups of network actors, idols or role models were mentioned as relevant for goal setting or motivation. Ivaldi (2015) found that such role models did not necessarily need to be famous musicians in order to inspire musicians to higher achievements. According to the current results, listening to music by other artists was a main driver for many musicians to start instrumental practice and set themselves goals. This informal, but sometimes also formal, listening to music fostered their motivation to engage in music practice and acquire new knowledge which enhanced their musical skills. Although idols are often not directly present during the practice process, the results suggest that their role should not be underestimated. Nowadays, many top musicians offer master classes on internet platforms where they explain in detail certain songs or exercises, they have used in their own learning. These courses are easily accessible and some experts in the studies of the current dissertation reported using such platforms occasionally to enhance their musical skills. Such platforms or online lessons could therefore be an important resource for music practice in the future.

Overall, the results revealed that chiefly peers (band members, peers from the music community, and classmates at the conservatoire), instrumental teachers, mentor and idols were perceived as the relevant network actors for practice in general and for different aspects of deliberate practice of popular musicians. The results suggested that not only teachers, but other network actors, are able to provide support for music learning and foster deliberate practice. Therefore, the whole network should be taken into account when the theoretical framework of deliberate practice is discussed. For example, Hakkarainen et al.'s (2004) framework on networked expertise provides fruitful ways of exploring expertise in relation to social network. Social network analysis confirmed itself as a useful tool to investigate how such networks are composed and how different relations to network actors can be described. It is not limited in its application to research on the support of practice,

as other relevant factors, such as getting access to gig opportunities, could be investigated through a social network perspective.

8.3 Change in the networks of popular musicians

The results indicated that a change in networks seems to be relevant to the acquisition of expertise in music. Similarly, Gruber et al. (2008) argued that high ability levels in jazz music are created through transitions and new network relations. This might also be true for popular music. The current results revealed that compared to networks of intermediates, the composition of networks of expert popular musicians was more dynamic and less stable across the three phases of their expertise development. This means that more network actors entered and/or left the networks over time. These changes were most likely led by the career decisions of the experts, who left their networks from childhood, entered a conservatoire (or popular music academy) and later began careers as professional musicians. Musicians who stayed at an intermediate level only occasionally changed their bands or even stayed in the same bands they had formed during childhood. Research by Wrzus et al. (2013) explained that such major life events could have a strong impact on the network and foster changes in the networks. The current results focussed on changes *between* the three phases, but it seems obvious that networks are also changing *during* these phases. Therefore, future research should explicitly focus on certain phases and investigate change patterns.

For almost all aspects of deliberate practice, the networks of experts and intermediates show a constant decrease in the number of network actors from childhood to apprenticeship to career. This reflects the findings by Wrzus et al. (2013) that the network size of an individual decreases over the lifespan. Nevertheless, an increase in the number of network actors was found supporting the motivation of experts between apprenticeship and career, as well for error correction among the intermediates. This could be an indicator that network actors are highly relevant for these aspects of deliberate practice during the career. The experts might have received motivation from an increasing number of network actors because they changed their bands and were occasionally in contact with different band members. Playing in newly formed bands with previously unknown band members could have been a motivator for the experts to practise the relevant material. The increase of network actors in intermediate networks might be explained by a continued need for help in correcting their performance mistakes.

In relation to different aspects of deliberate practice, the results indicated that network actors supporting motivation and feedback of experts changed most between childhood and apprenticeship. Between apprenticeship and career, the largest changes were found regarding feedback and receiving new learning content. Being motivated during childhood by a changing composition of network actors is likely to have led to more persistence and boosted the self-esteem of the experts to continue with their music practice. This is needed because deliberate practice is a very demanding and exhausting activity (Ericsson et al., 1993; Lehmann & Ericsson, 1997). Receiving feedback from a variety of changing network actors across all phases of expertise might have offered different perspectives on how certain pieces could be performed better or which exercises could enhance their skill level. This supports Ericsson's (2016, 2020) claim that immediate feedback is a major aspect of deliberate practice. The high change ratio found for the networks providing new learning content may have resulted from a strong decrease in the number of network actors from childhood to the career phase. Additionally, the largest difference in the number of network actors was found for those who provided new learning content during childhood. This means that the experts had contact with a larger amount of network actors who provided them with new learning content that extended their musical knowledge during childhood. This would have prepared them to enter music conservatoires, because they demand a large amount of prior knowledge in music. In addition, the second largest difference in the number of network actors was found for network actors who supported goal setting for experts during all phases of expertise development. In general, the networks of expert musicians in this study contained a larger amount of network actor in general and for supporting the different aspects of deliberate practice over all phases of expertise development. Zwaan et al. (2010) also described that experts in popular music had access to a more extensive social network and received more social support. Such quantitative differences might lead to qualitative differences in complex systems such as networks (Schoonenboom, 2020). The results of this dissertation indicate the same. The experts had more network actors available to support different aspects of deliberate practice during their lifespan. Consequently, their networks could provide a higher qualitative contribution to their expertise development.

9. Implications for musicians, teachers and for research on expertise development, deliberate practice, and social networks

The findings of the current dissertation provide an overview of the composition of social networks, how network actors support practice and how networks of popular musicians change across developmental phases of expertise. They have implications for musicians, teachers, and researchers who aim to investigate expertise development, deliberate practice, and the role of social networks in music (and other domains).

The findings revealed that different network actors supported practice in popular music and hence significantly contributed to the expertise development of musicians. To reach expertise in a certain domain, practice – especially deliberate practice – was mentioned as necessary (Ericsson, 2016, 2020). Not only teachers, but a variety of network actors (foremost peers) contribute their support to different aspects of deliberate practice. This seems to be especially the case in domains (or genres) where informal practice traditions are prevalent and teachers might play a minor role. On one hand, the current findings might be applicable to other genres of music or domains with informal learning traditions, like jazz, the arts, or certain types of sports. Future investigations into such domains might be fruitful to extend the currently existing knowledge on the acquisition of expertise. On the other hand, findings might not be transferrable to domains with formal learning traditions, like classical music or learning in schools. Comparing the networks of domains with formal and informal learning traditions could provide a broader view on how the role of social network during development of expertise can be understood and supported. As already mentioned in chapter 3.2, a first step towards verifying this claim has already been taken. A study is currently being prepared for submission which focusses on differences in social network support for experts in their practice of classical and popular music.

The above-mentioned findings bear some practical implications for musicians aiming to learn an instrument in popular music and for instrumental teachers. Practising together with peers allowed musicians (experts as well as beginners) to exchange knowledge and get different viewpoints how certain material could be practised. Band practice with peers was perceived as motivating and required the musicians to expand their own musical knowledge. During collective practice in band sessions, constructive feedback and an immediate correction of errors could be provided to identify and remedy weaknesses. In addition, instrumental teachers can help to further expand musical knowledge and give feedback on the practice process. Support by both peers and instrumental teachers should not be exclusive but complementary both for solitary and for collective music practice. For

example, instrumental teachers could join and foster band practice sessions during which they provide feedback or share their knowledge. Therefore, musicians (especially beginners) should aim to constantly expand their own network right from the start of their instrumental practice.

The findings suggest that change in the social network is beneficial during the acquisition of expertise. If researchers want to focus on the developmental aspect of expertise, they should consider that networks change over time. The entrances and exits of network actors can have a strong impact on the practice of the individual, because the quality of support provided by these actors might change over time. The findings of the current dissertation focussed on the whole network of musicians and could not provide distinctions on how different groups of network actors, like peers or teachers, change. Future research could focus in more detail on how certain groups of networks change over time, which would provide deeper insights into the predominant processes in social networks.

The findings about how networks change also have practical implications for musicians, music schools, and teachers. On the one hand, established musicians might be prompted to reflect on their own network and increase their awareness that change has been and will be crucial for their musical development. On the other hand, young musicians aiming to become experts, in particular, should be motivated to focus more on changing and/or expanding their network. Young musicians might tend to stay in their networks (especially bands) over a long period of time, because they are friends or because they might be afraid to fail when performing with other bands. However, it is important for musicians to be encouraged to engage in music making with other musicians. In addition, musicians should be encouraged to change their instrumental teacher when no progress is achieved, even if another teacher might be more demanding. The findings might also be interesting for music schools, higher music education institutions and teachers when it comes to individual practice sessions or ensemble practice. Individual practice sessions could be provided with varying teachers to provide different points of view on the subject matter. Ensemble practice in music schools or higher education could be designed in a way that changes in ensemble membership are promoted and possibilities are provided to perform with different musicians.

The findings of the current dissertation are based on the results of studies with explorative and qualitative research designs using small sample sizes. This limits the generalisability of the findings to a broader population. Using larger sample sizes in future

research studies could add more explanatory power to understand the composition of networks and the relations within it. This could be achieved by using research designs focussing on the collection of quantitative network data (e.g., number of relations, reciprocity or tie strength) with which other network measurements, like density, betweenness, or closeness, can be calculated.

The two studies in which social network analysis was applied focussed retrospectively on different phases of expertise development. The phases of expertise development were predefined by the researchers to give the participants a clear timespan to focus on. Another possibility would have been using a time beam method over the whole timespan in which expertise is acquired. This could be particularly interesting for researchers who want to focus on or uncover critical moments in the development of individuals and what impact certain network actors (or network structures) had during these events. In addition, using a retrospective approach, data collection harbours the danger that participants might forget to mention relevant network actors or have inaccurate recollections of how the support by these network actors was provided. Long-term studies could be used to monitor children who are aiming to learn an instrument and trace their networks from the beginning of their instrumental practice.

The application of mixed method social network analysis (MMSNA) was found to be a useful tool to investigate social network support and change. If researchers are aiming to examine the role of social networks, the application of MMSNA should be considered. By combining different instruments for data collection (e.g., interviews and network visualisations) different types of network data can be derived. This offers a broad range of possibilities to analyse different strands of social network data at the same time and to provide multi-layered viewpoints on the data for the readers of publications. The more detailed the explanations, the deeper researchers can gain an understanding of the functioning of a complex system like a social network. The application of MMSNA is an emerging field in educational science and its application should be considered in the design of future research projects in different research fields, for example in schools or workplaces.

In conclusion, social networks play a major role in expertise development and the deliberate practice of individuals. The application of social network analysis is not limited to the domain of music, but can be transferred to almost every domain in which individuals interact with each other. Future research could focus on the role of social networks during

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expertise development in other domains. This would provide a deeper understanding of how expertise is acquired, with applications in both theory and practice.

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