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Quality of network support for the deliberate practice of popular musicians

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Abstract

To become an expert in music, an individual goes through different phases of deliberately practising domain-specific activities with the support of actors within his or her network. These network actors are often referred to in the research literature as “persons in the shadow,” because they are for the most part unnoticeable to an audience. Systematic research on popular music does not touch upon who these persons in the shadow are and how they support deliberate practice. Therefore, the aim of this study was to examine which network actors have supported popular musicians to deliberately practice their craft during childhood, the period of apprenticeship, and throughout their careers, along with the type of support that was provided. A mixed-method egocentric network analysis, combined with quantitative and qualitative analyses of data from interviews with five experts and five intermediate-level popular musicians, has shown that band members and instrumental teachers were perceived as being most supportive of musicians’ deliberate practice during childhood and period of apprenticeship. However, during the musicians’ careers, band members were perceived as being most supportive. Experts differed from intermediate-level musicians as follows: (a) experts had contact with a larger pool of band members and instrumental teachers during their careers; (b) their networks, especially of band members in different formations and instrumental teachers, changed constantly and frequently throughout their careers; (c) they were regularly confronted with unfamiliar musical content, which expanded their musical knowledge. In this article we suggest that future research should investigate how change in networks influences deliberate practice and the acquisition of expertise.

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Keywords

Deliberate practice, developmental phases, expertise, music, persons in the shadow, social networks

The acquisition of expertise in music requires an individual to engage in the long-term, deliberate practice of domain-specific activities (Feltovich et al., 2018). Musicians go through different developmental phases (or stages) from being novices to becoming experts (Bloom, 1985; Dreyfus, 2004). During these phases, musicians carry out large amounts of deliberate practice designed in and supported by training environments (Feltovich et al., 2018). Such training environments can be described as networks and the individuals within these networks are known as network actors. As the aims of practice may change over time in response to changing demands on the musician, the role of network actors and indeed the actors themselves may change. Expert musicians may also be supported by different network actors and receive different kinds of support compared with those who remain at the intermediate level.

Such networks are often said to consist of “persons in the shadow” who take a leading role in supporting a musician’s deliberate practice (Längler et al., 2018; Gruber et al., 2008; Lehmann & Kristensen, 2014). As the term suggests, it is difficult to grasp who they are, because they are hidden “in the shadow” of the musician. Past research has revealed that networks of so-called persons in the shadow include peers, parents and teachers (Längler et al., 2018). However, support for deliberate practice may be provided throughout a musician’s career by other network actors such as managers and producers. Systematically uncovering persons in the shadow, using a social network approach, can provide new insights into the development of expertise in music during the different phases of a musician’s life.

The roles of particular groups of network actors may differ from one music genre to another. In popular music, peers are seen as the main supporters of music learning (Lebler, 2008) whereas, in classical music, parents and teachers typically take a leading role (Creech, 2016; Welch & Ockelford, 2016). The findings of research pertaining to classical music have limited their generalizability to popular music, given the differences between the two genres and the variety of supporting roles that exist (Papageorgi et al., 2009). As most studies on the acquisition of expertise in music focus on classical music, we chose to focus on popular music.

In this study we aimed to uncover which network actors provide support for deliberate practice to musicians throughout their careers, and how they give this support, by comparing expert and intermediate-level popular musicians. To achieve this aim, we took a systematic approach. Within the context of Bloom’s (1985) phase model of expertise acquisition in music and Ericsson’s (2016) definition of deliberate practice, we combined an egocentric network analysis with qualitative research on persons in the shadow. We used this theoretical background because (a) Bloom’s (1985) model, which provides a well-structured overview of the career of musicians, is widely cited in the literature, (b) Ericsson (2016) also provides a well-structured overview, but of deliberate practice, a topic that he and others have been exploring since the early 1990s in various domains, and (c) the investigation concerned the potential supporters of deliberate practice (Längler et al., 2018; Gruber et al., 2008; Lehmann & Kristensen, 2014).

This study is an attempt to explore networks in music, using an egocentric network analysis, by recruiting a relatively small sample of musicians from Germany and Austria. All the expert musicians who took part in this study had been enrolled in a conservatory or university program of study before embarking on their careers as professional musicians. This limits the generalizability of the findings to other countries and to self-taught musicians.

Expertise and phases of acquiring expertise in music

What is an expert and how do individuals become experts in music? According to Dreyfus (2004), an expert is an individual who has progressively acquired domain-relevant skills through intensive practice. Ericsson et al. (1993) referred to this intensive practice as “deliberate” practice, necessary to attain musical expertise. The acquisition of expertise is determined not only by the quantity of practice, but also its quality (Evans & McPherson, 2014). An expert in music is a person who performs at a superior level, in comparison with their peers, and can reproduce their performance on repeated occasions (Ericsson et al., 2007).

Expertise in music is acquired through practice. This can be seen as a lifetime endeavor, but to understand the whole developmental process it can be helpful to divide its timeline into smaller units (Lehmann et al., 2018) such as phases (Myers et al., 2013) or stages. Various phase models are used to illustrate the development of expertise, over the lifespan, in different domains. In music, Bloom’s (1985) model of three phases is well known: (a) introduction to the instrument and playful engagement with the instrument, (b) formal training with deliberate practice, and (c) full-time commitment to music.

Typically during a musician’s childhood years, informal learning and playing dominate the first phase. Popular musicians are often introduced to an instrument by their peers and prefer to engage in peer-to-peer learning activities without a great deal of support from their parents or teachers (Längler et al., 2018; Lebler, 2008). Typically also during the musician’s childhood years, formal tuition and deliberate practice activities are introduced in the second phase by teachers, mentors, or coaches. When young musicians aspire to a professional career, they often attend conservatories, or other institutions of higher education such as music schools, in search of an apprenticeship. At these institutions, they learn the knowledge and acquire the skills they will need as professional musicians, mainly through curricula with a strong emphasis on formal practice, with support from their teachers. In classical music, attending a conservatory is almost a prerequisite for a career as a professional musician. In popular music, it can be beneficial to attend a conservatory, although career opportunities are more likely to occur through a musician’s associations with gatekeepers to the music business such as producers, bookers, and managers, than as the result of attaining a degree from a university or conservatory of music. In the third phase, when musicians have completed their higher education, they make a full-time commitment to music. During their careers, they often perform with others in bands and/or orchestras, or with music producers, to give memorable concerts and create other lasting contributions such as recordings (McPherson et al., 2012). Contact with gatekeepers is especially important during this third phase, as it is the gatekeepers who provide musicians with the resources they need to begin and maintain their careers.

Networks of musicians

Individuals’ music practice depends on relationships with people in their networks who provide support. These networks can be seen as training environments in which individuals are supported by network actors to refine their practice in ways that enable them to learn complex skills and ultimately to perform at superior levels (Feltovich et al., 2018). Research on the professional development of teachers has shown that professionals require networks to gain new knowledge, develop expertise, and function successfully (Vaessen et al., 2014). This also applies to the domain of music, where musicians – especially expert performers – are embedded in networks that support knowledge creation and practice processes. Creech et al. (2008) have found that, to become professional musicians, beginners have to be embedded in communities of

practice. Such communities form networks conducive to knowledge sharing, collaboration, and participation, which are crucial for musicians' acquisition of skills (Kenny, 2016).

Deliberate practice and social support in music

Research on deliberate practice plays a key role in understanding how musicians acquire expertise (Platz et al., 2014). Ericsson (2016) explains that deliberate practice is supported mainly by teachers, who set goals and provide a structured training plan, immediate feedback, the correction of mistakes and extrinsic motivation. From the teacher's perspective, the learning content (i.e., what the student practises) should always challenge the student's current level of knowledge so as to improve their performance (Bonneville-Roussy & Bouffard, 2015). Thus the teacher can be seen as a network actor acknowledging the student's current level of knowledge and providing appropriate guidance to help them master more difficult tasks, according to Vygotsky's model of the zone of proximal development (Valsiner & van der Veer, 1999).

Bonneville-Roussy and Bouffard (2015) propose that deliberate practice in music is goal-directed. Goals can be set by the individual or by the environment supporting the learner (Hallam, 2016). Smith (2005) has shown that they are beneficial for achievement in the domain of music as they help learners to structure their practice. Platz et al. (2014) conceptualize deliberate practice as a structured activity with explicit goals designed by a coach or trainer. Teachers help students carry out deliberate practice as a structured activity by providing learning materials such as scales or arpeggios that have been chosen to extend the student's musical knowledge; alternatively, the teacher might divide songs into short sections that the student can learn and practice separately before combining them. Längler et al. (2018) have found that peers are perceived as most supportive when it comes to the development of expertise among guitarists, giving purpose to, and directing, their practice behavior. Nielsen et al. (2018) explain that there is an overlap between the influence of peers and instrumental teachers.

Hallam (2013) argues that feedback provided by parents, teachers, and peers influences self-beliefs and provides opportunities to exhibit enhanced musical skills. Gaggioli et al. (2017) describe unambiguous feedback from the musical environment as a crucial variable for flow in ensemble performance. Immediate and task-specific feedback from different sources such as teachers and peers can support learners by helping them to understand and achieve musical goals (Freer, 2009). An important aspect of feedback is the explicit correction of mistakes, as it familiarizes learners with their weaknesses and enables them to improve. For example, Thorley (2018) found that "failed" performances while learning music recording and production support the development of critical listening and thinking skills. Degner et al. (2003) explain that an important part of the jazz music teacher's work is to draw the individuals' attention to mistakes, and to correct them.

Deliberate practice can be an exhausting process; it is important for individuals to have the motivation, whether intrinsic or extrinsic, to persevere (Green, 2002; Hallam, 2016). Evans (2015) postulates that research on motivation is key to understanding how individuals become successful performers. McCormick and McPherson (2007) state that the quality of motivation is "the single most important dimension of success in achievement situations" (p. 37). Sichivitsa (2007) has found that parental involvement supports a child in valuing music, motivating them to participate in various musical activities in the future. Evans and McPherson (2014) explain that motivational resources such as the school environment are crucial in sustaining long and intensive practice periods.

Introduction to mixed-method egocentric network analysis for music research

Egocentric network analysis is used to investigate networks of different network actors (such as people and objects) and the relationships between them (such as support for deliberate practice) from the viewpoint of an individual referred to as the “ego”. Whether the network’s structure and composition are analyzed, or the relationships between the actors within it, depends on the research question. Hlebec and Kogovšek (2013) provide detailed advice on investigating social support using egocentric network analysis; this was applicable since we were studying social support for deliberate practice. The data collected using this method can be quantitative (e.g., we might ask how many network actors there are in a musician’s network), qualitative (e.g., we might wish to describe the relationships between the network actors and the ego), or both. We used a mixed-methods approach (Froehlich et al., 2020) involving interviews and network visualizations, and thus providing both “insider” and “outsider” perspectives (Edwards, 2010). Individuals’ insider perspectives on their relationships with network actors were obtained from qualitative interview data, while the researcher illustrated their outsider perspectives in tables of quantitative data and network visualizations. The triangulation of the two kinds of data was designed to enhance the explanatory power of the results (Hollstein, 2011).

Contribution to the research field

Given the lack of research in the field of networks in music, McAndrew and Everett (2015) have suggested that an examination of networks would extend and provide new knowledge on the social aspects of expertise development. This study is perhaps the first attempt to take a mixed-methods approach using an egocentric network analysis to examine social support for deliberate practice in music. It provides new insights into the acquisition of expertise through a structured investigation revealing persons in the shadow and the contributions they make to the development of various aspects of individuals’ ability to undertake deliberate practice in music.

As musicians acquire expertise in a series of phases (Bloom, 1985; Dreyfus, 2004), so different network actors are likely to support deliberate practice in each of these phases. This study aims to provide a new understanding of deliberate practice throughout a musician’s life, linking particular network actors, and the support they provide for deliberate practice, with particular phases of expertise acquisition.

Most research on musical expertise has focused on classical music (Lehmann et al., 2018), which has a strong tradition of formal teaching and learning in which deliberate practice is supported mainly by parents and teachers. By contrast, less is known about the popular music genre with its tradition of relatively informal learning. This study provides new insights into the ways in which musicians acquire expertise through deliberate practice in informal settings, specifically popular music.

Aim and research questions

The aim of the study was to examine the network actors who support deliberate practice, and how they support it, in the networks of expert and intermediate-level popular musicians during three phases: childhood, period of apprenticeship, and career. To achieve this aim, we asked the following questions with reference to each of the three phases:

1. Which network actors support the deliberate practice of expert and intermediate-level popular musicians?
2. What kinds of support for deliberate practice do expert and intermediate-level popular musicians perceive themselves to receive from network actors?
3. What are the differences between the kinds of support for deliberate practice that are received by expert and intermediate-level popular musicians respectively?

Method

Design

This study examined the egocentric networks of popular musicians, expert and intermediate-level, with the aim of discovering retrospectively which network actors had supported each musician's deliberate practice throughout their childhood, period of apprenticeship and career, and how they had provided support. A mixed-methods approach was taken, using questionnaires to obtain demographic data, interviews, and network visualizations.

Sample

Theoretical sampling was applied, whereby popular musicians from Germany and Austria were asked to participate in the study. Music universities and music schools in both countries were approached via email and asked to forward the request for participation to their students and/or former students. In addition, musicians who were personal acquaintances of the researchers were asked to participate. Once initial contact had been made with 12 potential participants, the researcher used a theoretically driven multi-criteria tool based on Längler et al. (2018) to assess their curricula vitae so as to determine their status and allocate them to groups of experts or intermediate-level musicians as appropriate. The criteria used to allocate participants to one of the two groups are shown in Table 1. To ensure that allocation to groups was both objective and reliable, novices were not included in the sample, but both experts and intermediate-level musicians were required to have at least 10 years' experience in the music industry so that their networks would be well established. The experts had a mean of 25.2 ($SD = 11.3$) years of experience, while the intermediate-level musicians had a mean of 17.8 ($SD = 4.8$) years.

The final sample consisted of 10 male musicians (five experts, five intermediate-level musicians) aged between 25 and 54 years ($M = 33.6$, $SD = 4.8$). They are described in detail in Appendix A (see supplementary material).

Instruments

Demographic questionnaire. A demographic questionnaire was administered to obtain general information (name, age, sex, contact details) and music-related information (music education, length of time the participant had been engaged in music making, commercially available recordings, prizes for music) pertaining to participants. Finally, six questions were asked relating to the frequency and quantity of practice in the phases, defined as follows: *childhood*, beginning when the participant started playing their instrument and ending when they finished secondary school; *period of apprenticeship*, beginning when the participant finished secondary school and ending when they finished their apprenticeship (typically, during their tertiary-level or higher education music studies); and *career*, starting when they finished their apprenticeship and continuing into the present. The six questions included, for example:

Table 1. Allocation criteria for experts and intermediate-level musicians.

Group	Allocation criteria
Experts	<ol style="list-style-type: none"> 1. Top-level performer (contract with a record label, several commercially available recordings, at least 40 live concerts per year) 2. Extensive knowledge base with comprehensive experience of specific tasks in music (knowledge of different music genres, worked as teacher or musician in different genres) 3. Weekly occupation playing the instrument 4. Earn a living from making music 5. Musically experienced (at least ISCED Level 6)*
Intermediate-level musicians	<ol style="list-style-type: none"> 1. Hobby performer (active musician, at least three live concerts per year) 2. Monthly occupation playing the instrument 3. Musically experienced (at least ISCED Level 2)*

*Note. The ISCED Level (International Standard Classification System of Education) indicates the educational level of individuals.

“Approximately how many hours did you practise during your childhood/period of apprenticeship/career?” and “Approximately how many days per week did you practise during your childhood/period of apprenticeship/career?” The resulting data were used to confirm that each participant had been allocated to the correct group.

Semi-structured interviews. Individual semi-structured interviews were conducted to investigate each participant’s egocentric network. The interview was separated into three parts, one for each phase. First, the participant was asked for the names of the network actors who supported his practice in each phase (e.g., “Who supported your musical practice during your childhood/period of apprenticeship/career?”). Second, he was asked to identify the network actors he perceived to have supported each of the six components of deliberate practice (goal setting, a structured training plan, immediate feedback, the correction of mistakes, extrinsic motivation, and challenging learning content) and, third, to say how the network actors supported each of the components (e.g., “Did person X support your goal setting?” “How did person X support your goal setting?”). The interviews were conducted in German.

Network visualizations. During each interview, network maps, created with VennMaker 2.0.1, were used to collect the network actors’ names and thus to produce an overview of each participant’s network. Each map contained sectors that were used to allocate the network actors to particular categories such as parents, family members, schoolteachers, instrumental teachers, band members, friends, and others (see Figure 1).

Procedure

Each participant was asked to choose the location of the interview to ensure that it would be a comfortable environment for him. The first author (a) administered the demographic questionnaire, (b) read a short introduction to the study explaining its purpose and assuring the participant that his identity and that of his network actors would remain confidential, (c) conducted the interview, and (d) collected the network data. Interviews were audio-recorded using Audacity®. The participant was asked to name the network actors who had supported his practice during childhood. If he had difficulty remembering them, he would be asked more specific

Figure 1. Prototypical network map used for data collection.

Note. This figure displays a prototypical network used during the interviews. EGO, at the centre of the pie chart, represents the interviewee. The coloured slices represent the sub-groups: parents, family members, school teachers, instrumental teachers, peers, band members, and others. The actors within the sub-groups are shown as white circles.

questions focusing on particular groups of people (e.g., “Did your parents support you during musical practice?”). Throughout the interview the researcher entered all the network actors’ names into a network map. Whenever the participant referred to a group of people such as a band or wider musical community as important network actors, he was asked to say how many people there were in the group. This open mapping process allowed the participant to define his own network boundaries, prevented him from forgetting any network actors, and supported his reflections (Hollstein, 2011). Once the participant had recalled all the network actors, he would be asked specific questions about the role of each actor in relation to deliberate practice. If he remembered new network actors during this phase, they were added to the map, and he would be asked to supply information about them and/or their role(s). Finally, the participant categorized each network actor as a parent, family member, schoolteacher, instrumental teacher, band member, friend, or other. When this process had been completed for the childhood phase it was repeated for the period of apprenticeship and career phases. The interviews lasted between 60 and 120 minutes. The audio recordings were transcribed verbatim. The quotations used in this article were translated into English to increase their readability and the translations were checked by a native English speaker.

When the interview data had been analyzed the researcher produced new network maps for each participant. In four cases the researcher met with the participant on a second occasion to clarify the data to resolve uncertainties in the way they were interpreted.

Coding and analysis

Mayring's (2000) guidelines for deductive and inductive analysis were used to build a system of categories. A deductive approach was taken to identify topics and categories, as Bloom's (1985) and Ericsson's (2016) theoretical assumptions were used to frame the interviews. An inductive approach was taken to identify sub-categories, because the interview data permitted the categories to be interpreted more explicitly: if two participants uttered the same short phrase, it was considered a unit of analysis that could be assigned to a particular sub-category. Descriptions of each sub-category were provided by the researcher for an independent rater (Table 2). Based on Miles et al. (2014), matrices were produced relating each network actor to one or more sub-categories and tables were created to show the minimum, maximum, and median numbers of network actors related to each sub-category. The entire analysis comprised 11 steps, shown in Appendix B of the supplementary material. The final system of categories comprised 20 categories for each phase. Inter-rater reliability was calculated and was acceptable (Cohen's $\kappa = .96$). Table 2 presents an overview of the final system showing the main categories, sub-categories, and descriptions of each one.

Results

Research question 1: Which network actors support the deliberate practice of expert and intermediate-level popular musicians?

Table 3 shows the minimum, maximum, and median numbers of network actors perceived by each group of musicians to have supported their deliberate practice in each childhood, period of apprenticeship, and career.

All five experts reported that band members and idols had supported their practice during the childhood phase. Four referred to instrumental teachers and mentors, and at least three referred to peers in the music community. All five intermediate-level musicians reported that parents and band members supported their practice. Four referred to instrumental teachers, while three intermediate-level musicians referred to family members, peers in the music community, and idols.

All the experts reported that instrumental teachers and band members had supported their practice during the period of apprenticeship. Three referred to mentors, classmates at the conservatory, and idols. All the intermediate-level musicians referred to band members and three referred to peers in the music community.

All the experts reported that band members supported their practice during the career phase and three referred to their producers. All intermediate-level musicians referred to band members and four referred to peers in the music community.

Research question 2: What kinds of support for deliberate practice do expert and intermediate-level popular musicians perceive themselves to receive from network actors?

Tables C1–C6 in Appendix C (see supplementary material) show the minimum, maximum, and median numbers of network actors assigned to each of the four sub-groups of *family*, *teachers*, *peers*, and *others*, for each of the two groups of musicians and each of the three phases. The sub-group *family* comprises parents and other family members; *teachers* comprise instrumental teachers, mentors, music teachers at school, and workshop leaders; *peers* comprise band

Table 2. Description of the categories and sub-categories.

Category	Sub-category	Description	Anchor examples
Goal setting	Exercises	Goal to practise musical exercises, e.g., techniques, pentatonics, finger exercises to further develop musical skills	You got your exercises and just practised. (Tim)
	Songs	Goal to learn songs from other musicians	The conductor of the Big Band said: 'next week you have to learn these two new songs. (Tim) The teachers partly confronted me with music styles. I did not know before. (Hannes) And the bands of course! Because you want to compose your own songs. (Hannes) Bob Dylan and the Rolling Stones. The old stuff. We just listened to it, got familiar with it, got it shown on the guitar and just played it. (Max) The lessons were structured according to topics. And you got your exercises to practise. (Hannes) You have a kind of standardised structure. You start with listening to the song first, then you look for the basic structure, the chords and the rhythm. (Steve) In the band we structured own songs by ourselves. (Hannes) When he liked something, he said things like "awesome", "super". He emphasised it in a positive way immediately. (Tim) The guitar teacher was critical in any case and he gave constructive feedback in any case. (Steve) You also get negative feedback. (Hannes)
	Content from unfamiliar genres	Goal to learn (e.g., styles), patterns from previously unknown genres	
	Own compositions	Goal to realise own musical ideas	
Structuring content	Following idols	Goal to follow their musical idols	
	Exercises	Exercises were structured to further improve musician skills	
	Songs	Songs were structured to enable easier learning	
	Own compositions	Own compositions were structured	
Feedback	Encouraging feedback	Musician was encouraged for progress/performing	
	Constructive feedback	Musician received constructive feedback to improve	
	Destructive feedback	Musician received negative feedback without clear statements how to improve	
	Constructive correction of errors	Errors were detected and suggestions for improvements were made	He was someone, who told me, when I made an error. (Steve)
Motivation	Listening to own recording	Recordings of songs were used to detect errors in the performance	When we listened to the song, the producer sometimes said: "this was not very clean, let's play it again". (Jim)
	Extrinsic	Motivation was provided by actors from the network	The teachers were very good, the always motivated us. (Hannes)
	Intrinsic	Musicians motivated themselves	The reasons, why I stayed motivated. . . That was my own deep love to music right from the start. (Hannes) And I realised, oh, I need to learn a drum roll and I need to know how to do it. Then I started to practise right away. (Tim)
	New exercises	Previously unknown exercises, e.g., techniques, pentatonics, finger exercises, were provided to improve musical skills	They always brought me into ensembles, where I learned different songs, which were not played in my usual bands. (Hannes) They played a kind of Klezmer-Style and (. . .) everyone kept a sharp eye on the fingers of the other. (Jim)
New content	New songs	Previously unknown songs were learned to perform	What always provokes something new is the music that you listen to. (Hannes)
	Watching/jamming	New content was learned by watching or jamming with other musicians	My mother showed me Guitarissimo by Peter Hort and Sigfried Schwab from 1979. (Jim)
	Informal listening	New content was learned by listening to songs of other musicians	
	Books	New content was found in books	

Table 3. Number of actors supporting deliberate practice of the musicians during three career phases.

		Experts			Intermediate-level musicians		
		min.	max.	<i>Mdn.</i>	min.	max.	<i>Mdn.</i>
Childhood	Parents	0	2	0	2	2	2
	Family members	0	1	0	0	1	0
	Instrumental teachers	0	4	4	0	3	2
	Music teacher (school)	0	3	0	0	1	0
	Mentors	0	2	1	0	0	0
	Workshop leader	0	1	0	0	0	0
	Band members	4	200	23	3	25	3
	Peers	0	5	1	0	20	1
	Idols	1	1	1	0	1	1
	Internet channel	0	1	0	0	1	0
Apprenticeship	Books	0	1	0	0	1	0
	Parents	0	1	0	0	2	2
	Family members	0	1	0	0	1	0
	Instrumental teachers	2	5	2	0	1	0
	Mentors	0	2	1	0	1	0
	Band members	1	200	4	1	8	4
	Peers	0	50	0	0	15	4
	Classmates	0	8	5	0	0	0
	Idols	0	1	1	0	1	0
	Producer	0	1	0	0	0	0
Career	DJs	0	3	0	0	0	0
	Internet channel	0	1	0	0	0	0
	Books	0	1	0	0	0	0
	Parents	0	1	0	0	2	0
	Family members	0	2	0	0	0	0
	Mentors	0	1	0	0	0	0
	Workshop leaders	0	2	0	0	0	0
	Band members	1	50	5	1	12	4
	Peers	0	6	3	0	15	5
	Idols	0	1	1	0	1	0
	Producer	0	1	1	0	1	0
	DJs	0	2	0	0	0	0
	Internet channel	0	1	0	0	0	0
	Books	0	1	0	0	0	0

*Note. Minimum, maximum and median display the total number of actors separated for experts' and intermediate-level musicians' career phases. Minimum and maximum of band members differs largely in the expert group. A reason for this difference is that the small sample size in each group ($n=5$) is not robust to statistical outliers. Therefore, the median is displayed as a robust measurement to statistical outliers.

members, peers in the music community, and classmates; *others* comprise DJs, idols, internet channels, instructional books, and producers. Prototypical network maps in the form of pie charts were produced for each of the two groups of musicians and each of the three phases. The four sub-groups are shown as slices of the pie chart. The median numbers of network actors, as shown in Table 3, are represented within each sub-group, each one as a doughnut

chart with small colored segments indicating the kinds of support they offered. The size of the slices and the proximity of each network actor to the ego can be disregarded.

Experts in the childhood phase

Family. Participants Tim, Hannes, and Max said their practice had not been supported by their parents or other family members. Jim and Steve reported that their parents provided encouraging feedback and extrinsic motivation for practice.

Teachers. Tim, Hannes, Jim, and Steve reported that their instrumental teachers had set goals in the form of structured exercises (e.g., finger exercises to improve the performance of scales) and songs to learn, sometimes in unfamiliar genres, always building on their existing knowledge. Their feedback was encouraging and constructive, as was the way they corrected errors, and they provided extrinsic motivation for their students to practice. Tim, Max, Jim, and Steve reported at least one mentor who had also provided extrinsic motivation for practice, given encouraging feedback, and corrected their errors constructively. Tim described his mentor as follows: “when he liked something [he said] ‘Perfect,’ ‘Super.’ He always emphasized it immediately. For sure, as a young musician it is awesome to get such feedback from someone like him.” Max reported having had two mentors, one a musically advanced band member and the other a peer, who assumed roles similar to those of the instrumental teachers previously described.

Peers. All the experts reported that the other members of their bands set goals and structured songs in unfamiliar genres. They supported each other with constructive feedback and the correction of errors, and extrinsic motivation for practice. The other band members also provided new exercises. As Hannes said about the role of band practice: “Most things I learned with the band. Less from my teachers. . . It was goal-directed when we wanted to learn a new song.” Hannes, Max, and Jim also reported that they learned new material from jamming with peers in the music community and watching them perform.

Others. All the experts reported being inspired by idols to set themselves the goal of learning their songs.

Table C1 in Appendix C (see supplementary material) provides an overview of experts’ networks during the childhood phase, illustrated as a prototypical network in Figure 2.

Intermediate-level musicians in the childhood phase

Family. All the intermediate-level musicians reported that their parents provided encouraging feedback and extrinsic motivation for practice. “For practising they have. . . they didn’t force me, of course not. But they always reminded me and saw to it that I kept trying” (Ben).

Teachers. Like four of the five experts, Ben, Jake, Marc, and Linus reported that their instrumental teachers set them goals in the form of structured exercises and songs to learn, sometimes in unfamiliar genres. They offered constructive feedback and corrected errors constructively, and they provided extrinsic motivation for practice.

Peers. Like the experts, all the intermediate-level musicians reported that their bands set goals for themselves through the structured songs in unfamiliar genres. They too offered each other encouraging and constructive feedback, corrected errors constructively, and provided extrinsic motivation for each other’s practice. Talking about the other members of his band, Linus said, “We wanted to achieve something together and just write our own songs. And

Figure 2. Prototypical network of an expert musician in childhood.
Note. EGO, at the centre of the pie chart, represents the interviewee. The coloured slices represent the sub-groups: family, teachers, peers and others. The actors are shown as small doughnut charts: the coloured segments indicate the kinds of support they offered.

we started with very simple arrangements and this was basically the motivation in the end.” Andrew, Ben, Jake, and Marc also reported that they learned new material from jamming with peers in the music community, who provided encouraging and constructive feedback, and from watching them perform.

Others. Andrew, Jake, and Marc reported being inspired by idols to set themselves the goal of learning their songs.

Table C2 in Appendix C (see supplementary material) provides an overview of intermediate-level musicians’ networks during the childhood phase, illustrated in the form of a prototypical network in Figure 3.

Experts in the period of apprenticeship

Family. Participants Tim, Hannes, Max, and Steve said their practice had not been supported by their parents or other family members in this phase, although Jim reported that his mother provided encouraging feedback. His brother introduced him to new material by listening to new songs with him, informally, and provided extrinsic motivation for practice.

Teachers. All the experts reported that their instrumental teachers set them goals by giving them structured exercises to learn. Tim, Hannes, Max, and Jim reported that they provided constructive feedback and error correction, and extrinsic motivation for practice. Instrumental teachers also encouraged them to learn new songs, largely in the context of ensemble practice sessions during which they supervised groups of students performing different songs in a range of (up till then) unfamiliar genres. Asked who had supported his practice in this phase, Max responded “many, yes, all the teachers. That is to say, the whole school, all the teachers.” Hannes, Max, and Steve referred to mentors who also set goals by giving them structured exercises and songs to learn, sometimes in unfamiliar genres, but always building on their existing

Figure 3. Prototypical network of an intermediate-level musician in childhood.
Note. EGO, at the centre of the pie chart, represents the interviewee. The coloured slices represent the sub-groups: family, teachers, peers and others. The actors are shown as small doughnut charts: the coloured segments indicate the kinds of support they offered.

knowledge. Their feedback was constructive, as was the way they corrected errors, and they provided extrinsic motivation for practice.

Peers. All the experts reported that members of their bands or ensembles provided constructive feedback and extrinsic motivation. “This is very deliberate feedback. And this is a good thing, because you have, so to speak, you have to. . . you are looking for the mistakes the others make” (Jim). Tim, Hannes, and Max reported that band members set themselves the goal of learning exercises, songs and new material in unfamiliar genres; as a band, they also arranged and performed songs by their idols. Tim, Hannes, and Max described their classmates setting goals to learn songs, providing encouraging and constructive feedback, and introducing them to new material and that of their idols by jamming with or just watching them.

Others. Tim, Jim, and Steve were extrinsically motivated by their idols and learned new skills from watching or jamming with video recordings of them on internet platforms.

Table C3 in Appendix C (see supplementary material) provides an overview of experts’ networks during the period of apprenticeship, illustrated as a prototypical network in Figure 4.

Intermediate-level musicians in the period of apprenticeship

Family. Andrew, Ben, and Linus reported receiving encouragement from their parents. As Ben said, “from my parents. But no musically versed feedback, rather they said ‘we like that song.’”

Teachers. Andrew, Jake, Marc, and Linus said they did not receive any support from a teacher or mentor. Only Ben referred to an instrumental teacher and a mentor who set him goals for learning new songs, and provided extrinsic motivation for practice, constructive feedback, as well as correcting errors.

Figure 4. Prototypical network of an expert musician in the period of apprenticeship.
Note. EGO, at the centre of the pie chart, represents the interviewee. The coloured slices represent the sub-groups: family, teachers, peers and others. The actors are shown as small doughnut charts: the coloured segments indicate the kinds of support they offered.

Peers. All the intermediate-level musicians reported that band members set goals for learning new songs and provided extrinsic motivation for practice. Asked who was important for goal setting in this phase, Andrew said, “at this time in any case the band members. [. . .] But also other friends later on, when we were together. . . While studying there was a time where we met regularly and the incentive was to get better to have more possibilities to make music.” Andrew, Jake, Marc, and Linus referred to the structured nature of their learning of songs. Andrew, Marc, and Linus reported that the other members of the band had provided useful feedback and corrected errors constructively, while Andrew, Ben, and Linus described their bandmates as expanding their knowledge by introducing them to new songs.

Others. Andrew and Jake both referred to their idols being important for goal setting, providing them with extrinsic motivation to practice new songs in particular.

Table C4 in Appendix C (see supplementary material) provides an overview of intermediate-level musicians’ networks during the period of apprenticeship, illustrated as a prototypical network in Figure 5.

Experts in the career phase

Family. Hannes, Max, and Jim referred to members of their families in relation to deliberate practice. Hannes talked with his mother about using new exercises to extend his existing knowledge. Max reported that his wife and children provided him with encouraging feedback. Jim said that his brother, whom he had referred to when talking about the period of apprenticeship, continued to provide extrinsic motivation, introducing him to new songs in unfamiliar genres that they listened to together.

Figure 5. Prototypical network of an intermediate-level musician in the period of apprenticeship.

Note. EGO, at the centre of the pie chart, represents the interviewee. The coloured slices represent the sub-groups: family, teachers, peers and others. The actors are shown as small doughnut charts: the coloured segments indicate the kinds of support they offered.

Teachers. Only one of the experts, Hannes, referred to support from teachers during this phase. He reported having attended around 20 workshops delivered by a range of other experts, which encouraged him to set goals for working on exercises and introduced him to new music in other genres.

Peers. All the experts reported that the other members of their bands helped them set goals for writing music, offering constructive feedback and correcting their errors constructively. Tim, Hannes, Max, and Jim also said they helped them set goals for learning songs. As Tim commented, “The band S. in Berlin, totally heavy. . . I have never done something like this before. They called it TripHop. [. . .] It was rad. . . It was an extremely new experience for me and led to my setting extremely high goals.” Hannes, Jim, and Steve listened to recordings of their performances with their band members to detect mistakes. Max, Jim, and Steve reported that their practice was supported by their peers in the music community; specifically, through jamming and attending performances (Jim and Steve), while Max described the way they set him goals and structured songs to learn, providing extrinsic motivation for practice by offering useful feedback and correcting his errors constructively.

Others. Tim, Hannes, and Jim referred to watching and jamming with video recordings of their idols on internet platforms as important to their practice. Hannes, Max, and Jim reported that their record producers supported their goals and structured their exercises by providing them with constructive feedback, correcting their errors; Hannes commented, “we always go to external people. They are. . . right, they are important feedback providers, those recording people.”

Table C5 in Appendix C (see supplementary material) provides an overview of experts’ networks during the career phase, illustrated as a prototypical network in Figure 6.

Figure 6. Prototypical network of an expert musician during career.
Note. EGO, at the centre of the pie chart, represents the interviewee. The coloured slices represent the sub-groups: family, teachers, peers and others. The actors are shown as small doughnut charts: the coloured segments indicate the kinds of support they offered.

Intermediate-level musicians in the career phase

Family. Only one of the intermediate-level musicians, Andrew, reported receiving support from his family in this phase: he was extrinsically motivated to practice by his parents’ encouragement, and his brother’s constructive feedback, and the correction of errors.

Teachers. None of the intermediate-level musicians were receiving support from an instrumental teacher or mentor in this phase: “No, there was no one anymore. I stopped when I was 14 or something like this” (Marc).

Peers. Rather, they were all extrinsically motivated to practice during this phase by the other members of their bands, according to Andrew, Ben, Jake, and Linus, as they were helping them to set goals for learning songs and providing constructive feedback. As Jake said, “On the one hand music motivates me, when there is a song that I like. On the other hand, of course the band motivates me, too.” Andrew, Marc, and Linus referred to other band members’ support for writing their own compositions and jamming together; Andrew, Ben, and Marc were supported by band members to structure their learning of new songs. Andrew, Jake and Linus also referred to their peers in the music community who were supporting them to set goals to learn songs in unfamiliar genres in a structured way, by providing constructive feedback, correcting errors constructively, and providing extrinsic motivation. They also provided new content in the form of exercises, songs, or through jamming with them.

Others. Marc was the only intermediate-level musician who was working with a producer. He supported him by ensuring that his compositions adhered to an appropriate formal structure, by listening to recordings of his performances, and by offering constructive feedback.

Figure 7. Prototypical network of an intermediate-level musician in career.
Note. EGO, at the centre of the pie chart, represents the interviewee. The coloured slices represent the sub-groups: family, teachers, peers and others. The actors are shown as small doughnut charts: the coloured segments indicate the kinds of support they offered.

Table C6 in Appendix C (see supplementary material) provides an overview of intermediate-level musicians’ networks during the career phase, illustrated as a prototypical network in Figure 7.

Research question 3: What are the differences between the kinds of support for deliberate practice that are received by expert and intermediate-level popular musicians respectively?

This question was addressed using a combination of the quantitative data shown in Tables C1–6 in Appendix C (see supplementary material) and qualitative data from the interviews.

Childhood. The practice of both groups of participants had been supported predominantly by (mainly instrumental) teachers and peers, who were mainly the other members of the participants’ bands. More teachers and peers had been involved in the experts’ than the intermediate-level musicians’ practice, by supporting them to learn music in unfamiliar genres. Unlike the intermediate-level musicians, the experts received encouraging and usually constructive feedback from their teachers, and in four cases – again, unlike the intermediate-level musicians, who received no such guidance – from mentors who were perceived to have provided equivalent guidance. Qualitative data revealed that, unlike the intermediate-level musicians, the experts had performed in a variety of bands whose membership changed from time to time. The other members of the band introduced them to new exercises that extended their existing knowledge and helped them to structure the way they learned songs; they also provided constructive feedback, while the feedback received from the intermediate-level musicians’ band members was described only as “encouraging”. Similarly, all the intermediate-level

musicians had been extrinsically motivated by their parents' encouragement and/or constructive feedback, while this was the case for only two of the experts.

Period of apprenticeship. Both groups had received support from their peers in this phase, but the kinds of support differed: the experts had been introduced to music in different genres while the intermediate-level musicians had been helped to learn songs in a structured way. All the experts had played in a variety of bands whose membership changed from time, while the intermediate-level musicians had stayed in the bands they had formed in childhood. In addition, most of the experts, unlike the intermediate-level musicians, had been members of university or conservatory ensembles supported by instrumental teachers who provided feedback after performances. All the experts had continued to be supported by instrumental teachers during their higher education studies, while only one of the intermediate-level musicians (Ben) had continued to have lessons on his instrument. Nevertheless, the intermediate-level musicians had continued to be extrinsically motivated by their families' encouraging feedback, while the experts had not received any support from their families in this phase.

Career. In this phase, neither group of musicians reported their families or teachers as important to their practice. Rather, they both continued to be supported, to a large extent, by their peers: mostly, the other members of their bands. The majority of experts continued to play in a variety of bands whose membership changed from time, while the intermediate-level musicians went on playing with the bands they had formed in childhood or during the period of apprenticeship. The two groups received different kinds of support from their peers, in that those of the experts helped them learn songs in a structured way; also, the experts listened to recordings of their own compositions with the other members of their band and their record producer. They received constructive feedback from both during these sessions.

Discussion

The aim of this study was to understand which network actors in expert and intermediate-level popular musicians' networks support their deliberate practice, throughout their lives, and how they support it. These questions had not been addressed in previous research investigating the role of persons in the shadow as the main supporters of musicians' practice (Längler et al., 2018; Lehmann & Kristensen, 2014). The results of the study are consistent with the findings of this previous research and serve to broaden current understanding of this field of study. Both expert and intermediate-level musicians in childhood, during the period of their apprenticeships and in their careers, received support from *family*, including parents and other family members; *teachers*, including instrumental and school music teachers, mentors, and workshop leaders; *peers*, including band members, peers in the music community, and classmates; and *others*, including DJs, idols, internet channels, instructional books, and producers. Instrumental teachers and band members were identified as musicians' main supporters in each of the three phases. Teachers were important during the musicians' childhood and period of apprenticeship, while band members were important in all three phases.

Nevertheless, there were differences between the numbers of network actors supporting the two groups' deliberate practice in the three phases and the ways in which they supported it. From childhood, experts had more teachers than intermediate-level musicians and played with a wider variety of musicians in more bands; teachers and fellow band members alike were more likely to have introduced them to music in unfamiliar genres. This, coupled with changing band personnel, served to expand their musical knowledge and foster the acquisition of their expertise. This

finding supports Manturzevska's (1990) research on the biographies of classical musicians, which revealed that their professionalization depends on adjustment to changes in their social environment. Creech et al. (2008) similarly argue that multi-genre networks facilitate the development of professionalism in musicians. As Gruber et al. (2008) found in the context of jazz, most of the experts referred to one or more mentors who gave them constructive feedback when they were children and enhanced their motivation. Mentors' teaching roles are less formal than those of instrumental teachers and thus conform to learning traditions in popular music genres insofar as mentors are likely to value creativity and nonconformity (Vitale, 2011). Idols were identified as important in supporting experts to set goals for themselves during childhood. They can provide guidance by shaping children's and adults' values and behaviors (Anderson & Cavallaro, 2002). This finding is also in line with research by Ivaldi and O'Neill (2010), who explored the importance of role models in young musicians' lives. Young musicians aspire to be like their models, which means that they are more likely to set goals for themselves and for practice. Surprisingly, neither group of musicians reported receiving family support for practising music, although this is in line with Längler et al. (2018), who found in a study of children learning to play popular music on the guitar that their parents played a somewhat peripheral role.

Feltovich et al. (2018) explain that, to acquire expertise, individuals must practise domain-specific activities deliberately, and Ericsson (2016) emphasizes the crucial role of teachers and mentors in supporting deliberate practice, apparently neglecting that of peers. In the domain of music, the characteristics of the genre determine which activities require deliberate practice. For example, in popular music, successful band practice requires competence in playing by ear (Green, 2002) and group composition (Biasutti, 2012). Our results indicate that musicians perceive the other members of their band to be as important as teachers and mentors in supporting the deliberate practice of these activities. The concept of deliberate practice should be broadened to rehearsals and group composition with peers in popular music, as band members are well able to set goals, provide a structured training plan, give immediate feedback, correct mistakes, provide extrinsic motivation and introduce new knowledge that extends existing knowledge. As popular music has become increasingly acceptable as a subject to be taught at university or conservatory, young musicians have opportunities for receiving formal support from the outset of their studies. Informal support should be considered complementary to formal support for activities specific to the genre; they are not mutually exclusive.

In this study, we took a mixed-methods approach using an egocentric network analysis to view participants' networks from both outsider and insider perspectives (Edwards, 2010), provide a complete picture by combining them, and compare the networks of expert and intermediate-level popular musicians. The researchers' outsider perspective made use of quantitative data and is illustrated by network maps providing an overview of the number and nature of the network actors who were relevant to the participants' careers. The participants' insider perspectives were represented by qualitative data elicited from the interviews in which they described their relationships with, and the relationships between, the network actors.

Limitations and future directions

A major limitation of this study is the small sample size. As expertise is a scarce individual attribute, expert musicians are both difficult to find and to convince to take part in research studies. Its aim was to gain a deeper understanding of support for expert musicians' deliberate practice, in comparison with that of intermediate-level musicians, from their social and educational networks, so it was appropriate to undertake a network analysis. This method of data collection is time-consuming, which made it harder to find willing participants. The results of the study may not apply to other genres such as classical music or jazz, because to

perform them successfully musicians must undertake different kinds of learning activity. These involve working with notation in classical music, for example, while memorization and improvisational skills are of greater importance in jazz (Papageorgi et al., 2009). A future investigation of the roles of persons in the shadow could focus on the learning activities specific to each genre and how each one supports deliberate practice. In addition, the roles of persons in the shadow change as musicians acquire expertise (Gruber et al., 2008); after all, novices and experts required different kinds of support. We therefore recommend that this study be replicated with musicians in genres other than popular music, focusing on genre-relevant learning activities, and the support needs of novices and experts respectively. This would provide a broader explanation of the roles of persons in the shadow. Further recommendations for future research include investigating more closely how changes within networks influence deliberate practice and the acquisition of expertise. Our findings challenge those of research on the influence of family members, such as parents or siblings, in classical music, showing that the family has a major influence in childhood. The roles of band members should therefore be investigated more closely, as band members were shown to be important for musicians throughout their lives and careers. Network analysis as used in this study could be applied to other genres of music so as to produce new insights into social support for musical practice more widely.

The findings of this study add to the understanding already derived from research in music sociology and music psychology of social support for deliberate practice in music. They imply that there may be new opportunities for schools, universities, and conservatories to provide instruction and foster learning by encouraging young musicians to form their own bands albeit with the guidance of teachers, since both band members and teachers play such important roles in musicians' practice.

To conclude, different network actors contribute at different times and in different ways to popular musicians' acquisition of expertise. Its novel contribution is to suggest that, in contrast to the findings of research on classical music, musicians receive as much support for their deliberate practice from other members of their band as they do from instrumental teachers.

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Supplemental material

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