

**The Influence of In-Class Musical Exposure on Reading Proficiency and Vocabulary
Development in Early Second Language Learning:
A Synthesis and Research Proposal**

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Abstract

This literature review investigates the relation between musical exposure on the one hand and second language vocabulary acquisition and reading development among young learners on the other. It has been acknowledged that musical intelligence positively affects first language reading development, but little is known about its relation to second language reading development. With regard to vocabulary acquisition, it has been found that music has a positive effect on working memory, which is of high importance in vocabulary acquisition and retrieval, but mixed empirical results are found. Additionally, the interface between vocabulary and reading development is under investigation. In order to fill current literary gaps, an interventional research proposal is formulised and a lesson plan provided. A close investigation on methodological issues surrounding investigational research and a survey with 19 different respondents provided preliminary data that substantiate the choices made in the proposal. If positive effects were to be found when this study is conducted, more musical exposure in Dutch primary educational curricula would be encouraged.

Keywords: language acquisition, music, vocabulary acquisition, reading development

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Introduction

The language and music interface is a research area that has been widely studied for decades. It has been found that language and music have anatomical overlap and similar neural processing of cues (e.g. Brandt et al., 2012; Lake, 2003; Patel, 2011). Various studies noted a positive effect of music on linguistic as well as non-linguistic intelligence (e.g. Bernstorff & Stuber, 2014; Besson et al., 2011). Consequently, the question whether more exposure to music would positively influence language acquisition and/or development arose. The influence of music on several first language (L1) linguistic domains is generally acknowledged, such as on prosody (e.g. Brandt et al., 2012; Sallat & Jentschke, 2015), semantics (e.g. Medina, 1990) and reading proficiency (e.g. Darrow, 2008). A positive effect of music was found on the development of phonological and phonemic awareness, which are both of high importance when developing efficient reading skills (e.g. Hansen et al., 2014). Hence, the literature has generally agreed upon the fact that musical input stimulates the development of L1 reading skills. However, little is known about the effects of music on second language (L2) reading skills, and therefore the efficacy of music-use in L2 learning environments is still relatively uncertain.

Other L2 linguistic sub-domains have repeatedly been studied in relation to music, such as pronunciation accuracy (e.g. Milovanov et al., 2008) and vocabulary acquisition. It has been found that music has a positive effect on working memory (WM), which plays a significant role in vocabulary acquisition and retrieval (e.g. Gillam, 2002). However, there is ongoing debate on the effectiveness of music on vocabulary development. For example, Medina (1990) and its follow-up study (Obarow, 2004) did not find a significant difference in vocabulary growth in children that received more musical input. Swaminathan & Gopinath (2013), on the other hand, did find positive evidence for vocabulary enhancements in musically trained children. More research is needed in favour of clarity.

As one can imagine, the interface between reading and vocabulary is tight: it is likely that one cannot develop without influencing the other sub-domain. According to Cain et al. (2004) a concrete causal relation between the domains has yet to be established, but there is empirical evidence that supports a bidirectional interface (e.g. Hargrave & Sénéchal, 2000; Nippold, 2002). Since reading and vocabulary development are both investigated in this study, the interface should be taken into consideration while analysing certain results.

In order to fill the abovementioned literary gaps and testing whether musical exposure in classroom settings is beneficial for L2 reading and vocabulary development, this paper will try to make connections between previously executed research. Due to COVID-19, the current study cannot be conducted at this time. Hence, a methodology proposal will be provided, substantiated by a close reading on previously conducted interventional research and preliminary data gathered through a survey.

Theoretical Framework

1. Music, Language and Language Learning

The language domain consists of a tight neural network located in the left hemisphere of the brain including Broca's area and Wernicke's area (Besson et al., 2011; Papathanassiou et al., 2000). Various research methods (e.g. PET, fMRI, EEG & ERP) revealed similar neural activation when engaging in musical and linguistic activities (Besson et al., 2011; Brandt et al., 2012; Lake, 2003). This could be explained by commonalities in cues. For example, language and music both have sequential structures based on underlying, constraining rules, such as syntax (Besson et al., 2011). They additionally both rely on similar auditory parameters, such as frequency, pitch and rhythm (Besson et al., 2011). The commonalities in cues will reflect in the ease of processing of these cues. In other words, the tight neural network and overlap in cues results in interaction where the development of language-specific neurons will positively affect brain plasticity, which will have its influence on the processing

of music, and vice versa. As recipients are familiarised with a certain sequence, processing of musical/linguistic cues will be less effortful and further development of the complementary skill will be easier (Patel, 2011). Since more musical exposure improves neural plasticity in the language domain, the usage of music in language learning settings is often encouraged.

An additional factor that can advocate language in classroom settings is the level of students' attention and engagement. It is generally believed that learners should be actively engaged and maintain interest in the subject in order to successfully obtain information (Hansen et al., 2014). Positive experiences and emotions are also of great importance on learning outcomes, with pleasant experiences yielding greater learning outcomes. Patel (2011) ties the benefits of neural overlap and active engagement together in his OPERA-hypothesis. He states that "music-driven adaptive plasticity in speech processing networks occurs because five essential conditions are met" (p. 2). These conditions are overlap of neural network; precision, where higher processing demands on the neural network will yield greater learning outcomes; emotion; repetition, which states that repetitive information will be acquired easier; and attention. All these factors are of equal importance and contribute to the development of a stronger anatomical connection which facilitates language learning processes. Generally, music is likelier to meet all conditions: neural overlap between music and language has been acknowledged and the network is generally more stimulated by music than by language (Patel, 2011); musical cues are repetitive and generally yield more pleasant emotions in the recipient (Patel, 2011); and lastly, music is an effective attention-grabber (Bradley & Bradley, 1999; Hansen et al., 2014). Thus, according to Patel's OPERA-hypothesis (2011), music can indeed facilitate language learning processes more so than spoken counterparts.

In sum, musical exposure enhances facilitation of L1 learning primarily due to neural overlap. More exposure to music may result in improvement of verbal intelligence and various linguistic skills. Learners' level of engagement, encounters that yield positive

emotions and repetition of cues are significant predictors of language learning outcomes. This relation is established for first language learning but could very well have similar results in second language learning. However, second languages are often learned at a later age, sometimes after the end of the critical period. After this period, brain plasticity is reduced (Hensch, 2004), which might influence the level of success in improving (certain) language skills through music. Therefore, it is a necessity to further investigate the influence of musical exposure in L2 learning environments.

2. Music and Reading Proficiency

In the Netherlands, it is decided by law that children should get English lessons from age 10 (groep 7) at the latest, but English teaching regularly starts earlier. Schools are free to choose whether they start teaching English from groep 1/2 (vvto), from groep 5 (vervroegd Eibo) or from groep 7 (regular Eibo) onwards. In the last grade of primary school (groep 8), reading efficiency in English is not of high importance. Only 46% of Dutch schools regularly integrate reading activities in their English lessons (Rose, 2016), and the majority of children only achieve the minimum level of English reading proficiency in school: typical developing (TD) children are expected to be able to read short and simple English texts when they leave primary education.

One of the key elements for the development of accurate L1 and L2 reading skills is the ability to decode. Following the definition of Wilson & Gambrell (1988), decoding is “the breaking of the visual code of symbols into sounds” (as cited in Hansen et al., 2014, p. 21), i.e. translating visual letters to their auditory counterpart. This process is directly related to phonological awareness. Phonological awareness is a meta-cognitive skill that enables the recognition and discrimination of sound patterns (Anvari et al., 2002). The ability to vocalise written cues to auditory sounds enables the learner to recognise words or segments and their affiliated meaning. This recognition reduces the amount of time needed to process the written

cue, which in its turn facilitates greater reading rate. Various studies indeed found a direct causality between phonological awareness and reading ability among children as well as adults (e.g. Darrow, 2008; Tucker, 1981): greater phonological awareness predicted more sufficient reading outcomes. Music is beneficial in the development of phonological awareness, since the auditory input allows the learner to hear phonological realisations of certain words and/or sounds. Children and adults who are regularly engaged with music often outscore their less musically intelligent peers on both phonological awareness and reading efficiency tasks (Anvari et al., 2002; Brandt et al., 2012; Darrow, 2008; Hansen et al., 2014; Fisher & McDonald, 2001). In other words, listening to music enhances phonological awareness, which enhances reading skills. Little to no studies report on the effect of music on L2 phonological awareness, but there is no indication that it works differently in L2 learning environments.

A closely related skill to phonological awareness is phonemic awareness. Whereas phonology focuses on individual sounds, phonetics looks at the recognition of clusters and cluster sounds (Yopp & Yopp, 2000). When phonemic awareness grows, the learner can recognise clusters and/or words and translate those to their vocalisation, which also improves reading rate. Developing a sensitivity for rhythm and rhyme is essential for the development of phonemic awareness (Hansen et al., 2014). Prose generally has no syllabic rhythm and lacks rhyme, which makes it difficult for learners to recognise patterns. However, rhythm is available in all music, and rhyme is also of greater prominence in musical cues than in spoken language, especially in children's music and nursery rhymes (Hansen et al., 2014). These contribute to the development of greater phonemic awareness, and hence have influence on reading development. It is not unlikely that non-children's music contributes to phonemic awareness as well, since non-children's music also has rhythm and rhyme. Therefore, it might contribute to the development of reading skills in later stages of life and/or in a new language

too. Once phonological and phonemic awareness are accurately developed, reading fluency will/can be obtained. When reading goes fluently, the focus shifts from the process of reading to the abstraction of meaning from what is read (Hansen et al., 2014). In other words, the focus of non-fluent readers will be on the action (i.e. reading) before processing what they actually read, while fluent readers will process the meaning of what is read almost instantly. According to Hansen et al. (2014) music contributes to the development of such sight-identification skills, because of music's repetitive nature both lyric and rhythmic wise. In their words, "the inherent structure of music with a feeling of pulse or beat allows learners to experience frequency" (p. 53). Consequently, the use of music will result in familiarisation with frequency and repetition, which further stimulates the ability to read fluently.

In short, it has been established that music is positively correlated to the development of L1 reading skills. As mentioned above, musical exposure positively influences the development of phonological and phonemic awareness. These skills heavily contribute to the effectiveness of reading fluency, especially on reading rate. However, none of the abovementioned research focused on music and L2 reading development specifically. Nevertheless, it is not expected that musical exposure will yield different results on these cognitive abilities that facilitate L2 reading efficiency. Generally, TD children have learned how to read when learning an L2 and have sufficient phonological and phonemic awareness. The existence of these cognitive functions might carry on into L2 learning developments. Moreover, the critical period hypothesis has no implications on development of phonological awareness in L2s. It might very well be possible that music influences phonological and phonemic awareness in comparable manners, and hence yield a similar result on the development of fluent reading skills as in one's L1. In order to test this, it should be investigated whether in-class musical exposure influences reading efficiency in early L2 learning.

3. Music and Vocabulary Development

English in Dutch primary education is highly focused on the development of vocal fluency and listening skills in English, for which vocabulary is of high importance (Rose, 2016). During English lessons, vocabulary is mostly taught directly through the repetition of new words and short English conversations with peers and the teacher. Indirect vocabulary acquisition through, for example, playing games and singing songs is rarely done (Rose, 2016). Nevertheless, many children have reached a sufficient level of vocabulary knowledge when leaving primary school. In this section, Obarow's (2004) definition will be used, who defines vocabulary as "[...] the words we must know and understand in order to communicate effectively" (p. 2).

According to Gillam (2002), one of the primary cognitive abilities that account for the acquisition of new lexical items is working memory (WM). The phonological loop is a central executive part of WM that is specialized in learning new words and stimulated by attention, repetition and input frequency (Gillam, 2002). As previously mentioned in section 1, Patel's OPERA hypothesis (2011) claims that music more than spoken input yields positive emotional responses and greater attention and has a more repetitive nature. Thus, musical exposure stimulates the phonological loop in WM more so than spoken language, which in its turn facilitates the acquisition of new words. This reasoning is also found in various experimental studies that established the importance of WM on the acquisition of vocabulary (e.g. Martin & Ellis, 2012; Moreno et al., 2011). In their review article, Zeromskaite (2014) found reoccurring evidence for the positive relation between musical abilities and WM. Additionally, Besson et al. (2011) found that WM is heavily involved and activated during musical tasks. This reveals a cognitive overlap between musical processing and language development, in which musical skills can improve the efficiency of the WM system and thus indirectly account for more successful vocabulary acquisition and retrieval.

Even though it seems to be evident that musical intelligence could account for vocabulary acquisition through the beneficial effects on WM, mixed empirical results have been found. For example, Medina (1990) and its direct follow-up study by Obarow (2004) found no significant effect of musical exposure on English vocabulary development among young Spanish children. Out of their four groups (picture+music, picture only, music only, and control), only the picture+music group outperformed the three other groups when looking at vocabulary acquisition. Musical exposure only did not perform significantly better from the groups that did not receive musical exposure. This gives the impression that vocabulary acquisition happens regardless of input facilitation. On the other hand, Swaminathan & Gopinath (2013) studied the relation between English vocabulary acquisition and musical intelligence among Hindi children and found a positive relation between the two. More specifically, they found that children who had been exposed to music more often scored better on English vocabulary tests. These findings seem to directly oppose the findings by Medina (1990) and Obarow (2004), even though all of these three studies contained participants who were young children that had non-sufficient English proficiency scores. It could be speculated that cultural and/or L1 background have an impact on the effectiveness of music on L2 vocabulary acquisition. More research is necessary to investigate the relation between music and vocabulary learning in different linguistic environments.

Among later L2 learners, music and vocabulary seem to be related as well. For example, Xiangling & Brand (2009) found a positive effect of music on vocabulary growth in late English as an L2 (ESL) learners in mainland China. Of their three research groups (all-music, half-music, no-music), the all-music group outperformed the two other groups on the vocabulary post-tests and thus had acquired more lexical items than the other groups. An interesting additional finding was that from the three groups, the half-music group significantly scored the worst. According to Xiangling & Brand (2009), this could be

explained by the lower rating of attitude and emotional appreciation among students in the half-music group. This is additional evidence for Patel's OPERA hypothesis (2011) which holds emotion and attention in high regard for sufficient learning.

Thus, even though there has been more research on the influence of musical exposure on L2 vocabulary acquisition than on reading development, concrete evidence is still lacking. It is suspected that previous language knowledge and cultural background might be predictors of the effectiveness of music on vocabulary acquisition, but that remains uncertain. Nevertheless, the majority of studies found a positive effect from music on vocabulary development, which could possibly be explained by the underlying WM system that accounts for vocabulary acquisition. However, due to the conflicting results in previously conducted research, the question remains if in-class musical exposure influences vocabulary development in early L2 learning environments.

4. Reading and Vocabulary Interface

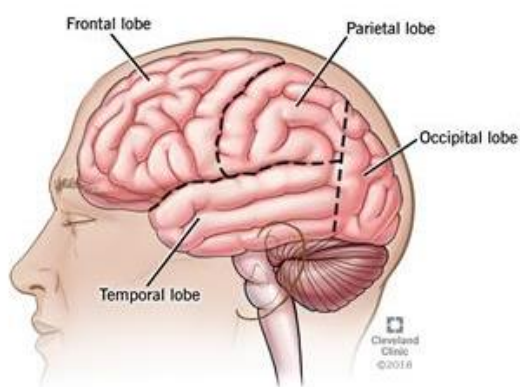
A strong relation between reading ability and vocabulary size has been acknowledged (Cain et al., 2004). It is likely that when one develops, it will positively affect the development of the other. However, there is a lack in current research that investigates whether the interface is indeed bidirectional and what the actual strength/level of cooperation between the two domains is. Since this study focuses on the influence of music on both vocabulary and reading development, it is of importance to take the interface into consideration.

It has been generally acknowledged that the brain areas concerned with language processing are, for right-handed people, ultimately located in the left hemisphere of the brain (e.g. Papathanassiou et al., 2000; Pratt & Whitaker, 2006). Cognitively, lexical items are processed by the WM system before ultimately being stored in the procedural memory system (Ullman & Pierpont, 2005). This deeper embedding is stimulated by repetitive exposure and

causes less effortful recalling of words. ERP studies (e.g. Mills et al., 2005) show changes in brain activities when a person encounters an unfamiliar word versus an acquired one. Mills et al., (2005) found that unfamiliar words spiked bilateral brain activities. Acquired words, on the other hand, triggered brain activity in the temporal and parietal regions of the left hemisphere only (see Figure 1). In this process, language experience is the determining factor that causes the increase in cerebral specialization for vocabulary (Mills et al., 2005). With regard to reading processes there is a wider variation in neural activation, but similarly to vocabulary, most of the activation is left hemispheric. Price et al. (1994) found that reading silently invigorated activity in the left posterior temporal lobe and the left extrastriate cortex, while reading aloud revealed activity in the left posterior temporal lobe as well as the left striate cortex. Thus, the two manners of reading have neural activation in the left posterior temporal lobe in common, which is also an area stimulated when recalling and/or encountering acquired vocabulary items. This overlap in brain activation makes the existence of a strong interface more plausible.

Figure 1

Anatomical Distribution of Brain Lobes



(Cleveland Clinic, 2018)

Empirically, there is more evidence that shows that reading and vocabulary have an influence on each other's development. This influence seems to be bidirectional: vocabulary size influences one's reading efficiency and vice versa. Regarding the latter, it has been found that most vocabulary items are learned indirectly (Obarow, 2004). A meta-analysis by Swanborn & de Glopper (1999) revealed that participants acquire up to 15% of unfamiliar words in textual encounters through context. This makes written language the superior discourse for indirect vocabulary acquisition (Nippold, 2002). The lexical environment of a new word replaces the need for explicit definitions. This is reinforced by results from various experimental studies. For example, both Hargrave & Sénéchal (2000) and Whitehurst et al. (1994) did reading interventions with students that had lagged L1 vocabulary sizes in comparison to their peers. Both studies found that a more engaging reading environment resulted in more lexical acquisition among participants. These results show that reading indeed can increase vocabulary acquisition.

Other studies have researched the contrary direction of the interface and found that greater vocabulary sizes positively affected reading skills (e.g. Mezynski, 1983). One common hypothesis originally proposed by Anderson & Freebody (1979) is the instrumentalist hypothesis. This hypothesis places direct causality between vocabulary knowledge and written text comprehension in the sense that "knowing the words enables text comprehension" (p. 3). In other words, a greater vocabulary size will ease the effort that is necessary to comprehend a written text. Consequently, as ownership of lexical items deepens, the reader can comprehend more difficult texts (Nippold, 2002). The most common explanation for the positive effect of vocabulary size on reading efficiency is the speed of access to lexical items (e.g. Daneman, 1988; as cited in Cain et al., 2004). As familiarisation with lexical items grows, it is easier to access these items from memory and recognise them in written form. Even though negative evidence is the minority, there are studies such as Pany et

al. (1982) that found results which do not align with the instrumentalist hypothesis. They found that greater vocabularies could account for better sentence comprehension, but not for passage comprehension. This could mean that greater vocabulary size cannot account for text comprehension on a larger scale. Additionally, limited vocabularies do not always lead to text comprehension difficulties (Cain et al., 2004). Hence, there is some debate on the strength and causality of the interface.

Even though there is strong and longstanding evidence that the interface between vocabulary and reading is present, its exact strength and direction remains debateable. Little to no studies have revealed whether the interface is also as apparent while learning an L2. Since this study is in L2 learning environments, the focus will be on whether there is an interface between reading and vocabulary development in such environments.

5. Intervention Studies

In order to create an accurate interventional methodology to test the hypotheses, a discrete and thorough investigation on previously done linguistic intervention studies is a necessity. When doing quantitative research with a variety of different (young) subjects, numerous of individual factors could influence one's performance, such as sex (e.g. Oxford et al., 1988), motivation (e.g. Patel, 2011), socio-economic status (SES)(e.g. Whitehurst et al., 1994), prior knowledge of the language (e.g. Unsworth et al., 2015), etcetera. This section will investigate some previously conducted intervention studies in the linguistic field and take various limitations and recommendations of these authors into consideration.

Interventional linguistic studies are widely executed with language learners. In order to test whether a treatment yields better outcomes than no treatment, researchers generally use a pre-test-post-test design, with a varying duration of treatment period between the two testing phases dependent per study. For example, Whitehurst et al. (1994) and Hargrave & Sénéchal (2000) studied the influence of dialogic reading on vocabulary development. They both found

positive evidence for the more engaging form of reading on vocabulary growth: Whitehurst et al. (1994) found this effect after an intervention period of six weeks, but Hargrave & Sénéchal (2000) found similar evidence after four weeks. In their meta-analysis on vocabulary development interventions, Marulis & Neuman (2010) revealed that their researched papers showed durational variety of intervention varying from one to 270 days, with a median of 42 days (i.e. six weeks or eight working weeks). Another variable in interventional studies is intervention frequency, i.e. the amount of time dedicated to each individual session in the intervention and the amount of sessions. Whereas Whitehurst et al. (1994) and Hargrave & Sénéchal (2000) both had ten-minute treatments five times a week, Coyne et al. (2007) had 30-40-minute treatments for a total of three times in their vocabulary intervention programme. On average, researchers choose for 18 sessions of approximately 10-20 minutes (Marulis & Neuman, 2010). Lastly, intervention studies have variation in group establishment as well. Some choose to assign participants randomly to either the treatment group or the control group, which increases the chances of accurate representation of the larger population. In matched-sample designs participants are divided based on covariates that are shared between participants. This reduces the variables' interference with the intervention to the extent that it is more certain that the treatment caused the change in scores and not the covariates.

Various linguists have tried to optimise the design of intervention plans with the focus on participant division, pre-test phase, the intervention itself and post-test analyses. In their intervention optimisation papers both Howard et al. (2014) and Vanhove (2015) argue for quasi-random subject division over the experimental- and control group(s): allocation should be random, since this is representative for a larger population and equals out “the effect of both measured (e.g., age) and unmeasured confounds (e.g., motivation, intelligence, chronotype, etc.) on average” (Vanhove, 2015, p. 137). However, baseline scores should certainly be taken into consideration prior to randomization. Furthermore, Vanhove (2015)

notes that some (but not all) background variables should be peer-matched if they could be of substantial influence on the outcomes of the tests. In other words, baseline scores and other covariates that could interfere with the analysis of solely the treatment should be considered before randomizing the subjects over control- and experimental group. The experimenter has to make decisions on which covariates should be discriminated before randomization.

During the pre-test phase the baseline scores of participants are established. Howard et al. (2014) recommended taking the pre-test on each participant (at least) twice in order to minimize the effect of chance. However, this recommendation is for single-case experimental designs. Following is the treatment phase, in which Howard et al. (2014) suggest doing a pre-determined number of sessions, but do not further specify on number and frequency. As Marulis & Neumann's meta-analysis on 67 vocabulary intervention studies (2010) revealed, the average is 18 sessions in 42 days, i.e. three sessions per week. However, deviations from this norm could occur based on background information and researchers' expectations.

Current Study

As established in the theoretical framework, there are several gaps in the literature regarding the effects and efficacy of in-class musical exposure on early L2 reading and vocabulary development. The current study is built around the following questions.

Research questions

The main research question (RQ) is formulated as follows: "To what extent does in-class musical exposure yield a positive effect on the development of reading skills and vocabulary size in early second language learning?". This question is segmented in three sub-questions:

RQ1: "Does in-class musical exposure influence reading efficiency in early second language learning?"

RQ2: "Does in-class musical exposure influence vocabulary development in early

second language learning?”

RQ3: “Is there an interface between reading efficiency and vocabulary size in second language learning, and if so, do they significantly influence each other?”

Hypotheses

Firstly, based on previously conducted research (e.g. Anvari et al., 2002; Darrow, 2008; Hansen et al., 2014) and limited to no counter-evidence, it is hypothesised that more musical exposure leads to greater reading efficiency in early L2 learning.

With regard to RQ2, it is hypothesised that musical exposure will positively influence L2 vocabulary development in the sense that greater musical exposure will result in greater vocabulary outcomes.

Lastly, based on the empirical evidence (e.g. Mezynski, 1983; Obarow, 2004) and neural evidence in L1 studies (e.g. Cain et al., 2004), it is hypothesised that a vocabulary-reading interface exists and that it develops in a bidirectional manner. In other words, it is likely that when reading efficiency grows, vocabulary development will experience a positive effect and vice versa, i.e. when vocabulary size increases, reading efficiency will experience beneficial effects.

Context

For this thesis, there are several variables, aside from baseline scores, that could affect the scores on the tests and need to be accounted for before being able to create equal research groups and drawing a fair conclusion on treatment effects. This section will explain the choices that are made to establish internal validity, before moving on to the methodology.

Firstly, a fair indicator of L2 development is prior language knowledge and experience (Unsworth et al., 2015; Rose, 2016). Similarly, musical intelligence and/or exposure is of high importance on language outcomes. It is rather plausible that children with more musical encounters, be it in playing/making and/or listening, will have a greater response to the

treatment. This information will be gathered through a questionnaire sent to parents, which will be discussed in more detail in the methodology.

Various studies found that children with lower SES often have lagging vocabularies in comparison to their peers (e.g. Whitehurst et al., 1994). Hence, it is likely that children from lower SES backgrounds perform worse at the vocabulary and possibly the reading tasks. Since this will be revealed in the pre-test performance before assigning children to either control or experimental group, SES will not be treated as a direct variable during analysis. Children who might perform worse at pre-test due to lower SES backgrounds will be matched to a peer with similar scores. This makes incorporating SES as a variable redundant. The same goes for participants' sex and age.

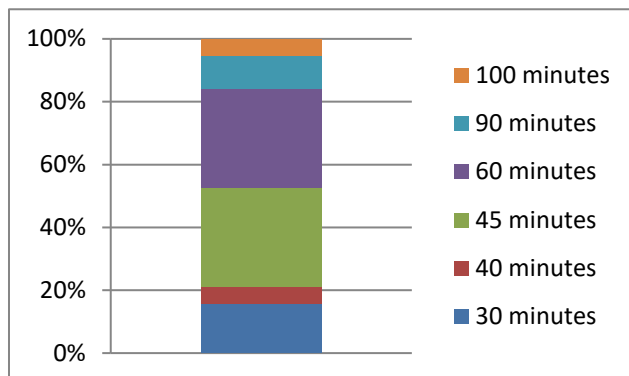
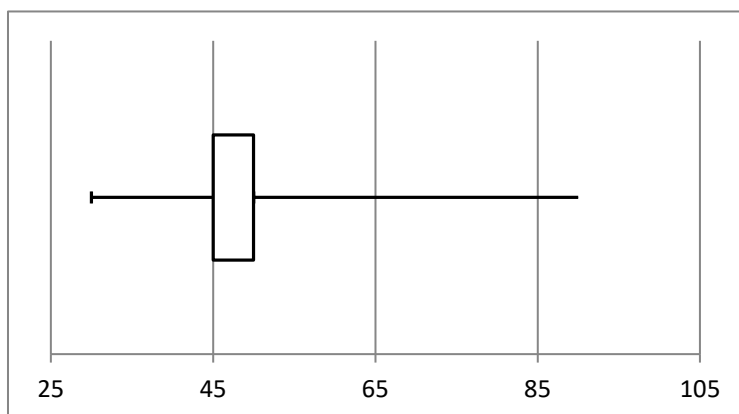
Lastly, Patel (2011) showed that engagement and motivation are of high importance in efficient learning. However, music will yield more engagement, motivation and positive emotional responses than spoken counterparts by design. This entails that the experimental group will naturally be more engaged/motivated/emotionally positive than the control group. Therefore, motivation will not be treated as a variable.

Method

Due to COVID-19, the research could currently not be conducted. Therefore, this methodology is in the form of a proposal for research that can be conducted later. In order to validate the choices made in this proposal, a survey was sent to a randomized selection of schools in the province Utrecht, the Netherlands (appendix A). A number of 67 independent schools were contacted through email and asked if one employee, either a groep 8 teacher, the principal or a language specialist, could answer the 17 questions. A total of 19 responses were gathered and their answers are taken into consideration as preliminary data in the following quantitative design.

Participants

Participants will be in groep 8 (US grade 6), which means they generally are 11/12 years of age. They will have had some experience with the English language but will not yet be proficient: the curriculum focuses on acquiring more vocabulary in order to comprehend and produce small English sequences (Rose, 2016). The survey revealed that in groep 8 the average amount of students per class is 22 ($\mu = 21.96$; $\sigma = 4.62$). Since one class might be a small sample size and therefore make the results less reliable, it is recommended that at least two different classes will be studied. Each individual class will be divided into two sub-groups: an experimental group and a control group that does not receive treatment. For this study it is of high importance to have a within-classes distribution. This way it is certain that the subjects receive identical language input aside from treatment and have had so in the past. Unsworth et al. (2015) additionally found that teachers' English proficiency and language use predicts children's language outcomes. Most of the survey respondents (57.9%) provide English lessons from groep 1/2, while fewer schools have later English lesson onset, either from groep 5 (15.8%), groep 6 (10.5%) or groep 7 (15.8%). As Figure 2 and 3 reveal, the duration of English classes varies between 30 and 100 minutes a week, with an average of 54.70 ($\sigma = 20.17$) minutes. Furthermore, on average children are exposed to 10.29 ($\sigma = 12.05$) minutes of English in school outside the regular English lessons. This leads to an average total of 62.94 ($\sigma = 19.37$) minutes of English exposure in scholarly settings per week (see Figure 4). It is expected that a later onset of English classes will result in a greater lesson duration in groep 8 (see Figure 5), but such correlation is not found ($r = .16$; $p = .51$).

Figure 2*Division of English Lesson Duration in Percentages***Figure 3***Distribution of English Lesson Duration in Minutes*

Note. Q1 and Med are both located at 45 minutes.

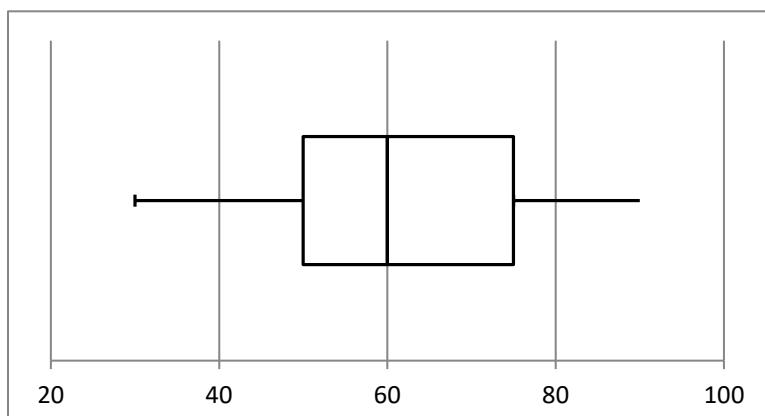
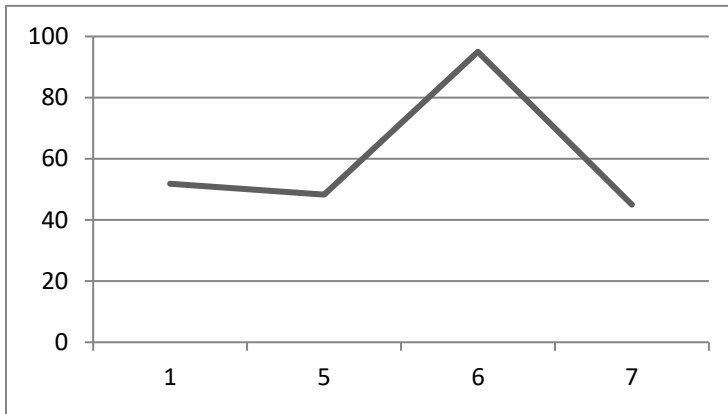
Figure 4*Distribution of Total In-School English Exposure in Minutes*

Figure 5.

Relation Between Total English Lesson Duration in Groep 8 in Minutes and English Lesson Onset (in Groep).



Since this study does not focus on differences between vvto and Eibo and/or differences in language outcomes based on amount of exposure, it is of importance to select schools with similar English lesson onset. The time and methods devoted to English class will be similar to, and representative of, the standard in Dutch monolingual primary schools (Unsworth et al., 2015), which means that results will be externally valid and can be generalised to the Dutch population.

Materials

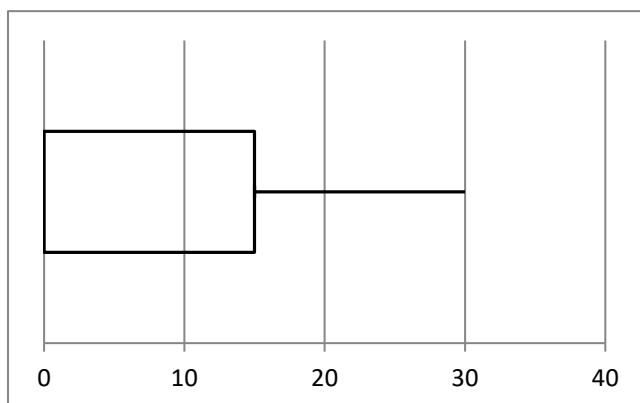
Prior to the treatment phase, a content sheet plus questionnaire will be sent to parents/caregivers of each participating child. This questionnaire will contain questions regarding L1, English and, where relevant, L2 language use, language proficiency and time devoted with each language encounter (e.g. in games, social media, films, etc.). Similarly, a variety of questions will account for musical knowledge/proficiency (e.g. playing instruments, reading notes) and musical encounters (e.g. amount and duration of exposure).

The pre- and post-test will consist of one test on each skill. To test reading proficiency, I suggest following Anvari et al.'s design (2002), who used the WRAT-3 test. This test begins with letter identification (which tests phonological sensitivity/awareness) and

ends with reading small sequences (which tests fluency). This will suit participants' English reading proficiency, since both Rose (2016) and the survey revealed that children are inexperienced with reading in English. Time devoted to reading in school varies from 15 to 150 minutes per week, with an average of 86.38 ($\sigma = 38.23$) minutes. However, reading in English varies from 0 to 30 minutes a week, with an average of 8.53 ($\sigma = 11.96$) minutes. As shown in Figure 6, at least half of the recipients scheduled no time on reading in English. This adds up to an average of only 9.76% of total in-class reading time devoted to English reading tasks in groep 8. This shows that children have very little experience with reading in English, which makes a reading test that starts at the beginning stages of reading proficiency (i.e. phonological awareness) suitable.

Figure 6

Distribution of Minutes per Week Devoted to Reading in English



For vocabulary, I suggest following several studies (e.g. Hargrave & Sénéchal, 2000; Coyne et al., 2007; Whitehurst et al., 1994) and use the Peabody Picture Vocabulary Test-Revised (PPVT-R)(Dunn & Dunn, 1981; as cited in Whitehurst et al., 1994). In this receptive vocabulary test, participants have to choose one out of four pictures that best resembles the lexical item asked for, without having to read.

The treatment music will be additional to the 35.53 ($\sigma = 11.89$) minutes of music per week the participants are exposed to on average. Most of these songs are used in music

lessons (84.1%). The lesson plan (Appendix B) includes a list with child-friendly songs, consisting of English pop-music only. Various sources recommend the use of pop music (e.g. Engh, 2013), because of its constraints on rhythm, melodic pitch and harmonic pitch to which people in western cultures are familiarised from infancy onwards (Anvari et al., 2002). Additionally, “popular songs use language commonly associated with the level of 11-year-old native English speakers, so the comparatively simple vocabulary is appropriate for students learning English” (Murphey, as cited in Xiangling & Brand, 2009). SPSS (IBM Corp., 2017) will be used to do statistical analyses, which will be discussed in more detail in the analysis.

Procedure

Prior to the treatment phase, the pre-tests will be conducted and the questionnaire filled in by parents/caregivers. Based on these outcomes, participants will be peer-matched and pseudo-randomly assigned over the two testing groups (see section 5). All children will partake in two pre-tests (i.e. each test once) and those scores will function as baseline scores. The decision on one pre-test is divergent from Howard et al.’s (2014) suggestion, but the effects of individual chance will be redundant due to the focus on group performance. All tests will be taken individually with the researcher in a familiar room in school so that participants are less likely to feel anxious or get distracted. If scores differ significantly from the norm, making accurate matching impossible, the child will be excluded from further participation. When the two sub-groups are created, the intervention period will begin. I suggest following the average intervention frequency of 18 sessions of 10-20 minutes each (Marulis & Neumann, 2010). Since most schools (63.16%) only provide one English lesson per week, the possibility of sessions will consequently reduce to once a week. Therefore, the interval between pre- and post-test will be 18 weeks (i.e. 4.5 months). Prior to the intervention, the teacher will get the lesson plan with explicit instructions on which songs to insert in their English lesson and on how to keep children’s attention on the songs (Appendix

B; Figure 7). The experimental group will listen to three songs (10-15 minutes) at the beginning of each English lesson. Meanwhile, the control group will take part in a supervised play session outside the classroom, as previously done in Whitehurst et al.'s study (1994). Children in the play group will be provided with construction toys (e.g. Lego) and encouraged to cooperatively build the toy within the 10-15-minute timeframe. After the treatment period, the post-tests will be taken. The first post-test will present the initial vocabulary and reading acquisition. The follow-up post-test, approximately after three more months, will show the retained acquisition. Scores will be put into SPSS (IBM Corp., 2017).

Figure 7

Lesson Plan Sample (see Appendix B)

Sessions: 18 sessions, once a week before each English lesson	Intervention duration: 18 weeks, i.e. 4,5 months	Session duration: 10 to 15 minutes each, i.e. three songs per session
Activity		
Students: a) actively listen to the three songs prior to the actual lesson. When songs are familiar, engagement could be shown with humming, singing, etc. b) answer questions the teacher provides between and after songs.	Teacher: a) engage children in listening to the songs, encourage participation (e.g. humming, singing, dancing). b) after each individual song, ask whether children knew the song, if they liked it, and other questions that checks on active participation. c) after each session, ask children which songs they liked the most.	
Materials		
Week 1		
Song	Duration	
1) <i>Uptown Funk</i> – Mark Ronson ft. Bruno Mars	4 min., 30 sec.	
2) <i>Girls Just Want to Have Fun</i> – Cyndi Lauper	3 min., 58 sec.	
3) <i>God Only Knows – Remastered</i> – The Beach Boys	2 min., 53 sec.	
	Total: 11 min., 21 sec.	

Analysis

Firstly, there should be an overall development over the time span from pre- to post-test in both groups, with a greater development in the experimental group. The development between pre- and post-test will be done by doing a paired samples t-test, with significance established when $p > .05$. RQ1 asks if there is a correlation between musical exposure and reading efficiency. According to the hypothesis, more musical exposure will lead to higher reading efficiency. A one-way ANOVA should reveal if experimental group indeed performed better than the control group on post-tests, and if so, by how much. A post-hoc

analysis will reveal if the difference between experimental and control group is significant, which is the case when $p > .05$. RQ2 looks for the correlation between musical exposure and vocabulary development. It is hypothesised that the experimental group will have experienced greater vocabulary development than the control group. Again, a one-way ANOVA will reveal if this is the case, and a post-hoc test will reveal statistical significance. Lastly, RQ3 is concerned with the vocabulary-reading interface. It is hypothesised that they have a positive bidirectional influence on each other. This would mean that all participants, regardless of group, have greater vocabulary development when reading efficiency has grown and vice versa. A Pearson-correlation will show if there is a relation between the two skills.

Discussion of Hypotheses

It is expected that the experimental groups will a) have greater reading outcomes, i.e. have significantly better scores than their control peers on the reading post-test; and b) have greater vocabulary sizes, i.e. score significantly better than the control group on the reading post-test. Thirdly, it is hypothesised that the interface between reading and vocabulary is bidirectional, which entails that all participants that experience improvement in reading scores, will also have a positive development in vocabulary scores, and vice versa. It is unlikely that participants will have a greater performance in post-test on one of the tasks without also performing better at the other task.

Conclusion

Music and language are anatomically and empirically overlapping. As previously mentioned, music enhances phonological awareness and phonemic awareness, which all have high importance in achieving reading fluency. However, these findings are based on findings in L1 literature, and little is known if this is also the case in ESL learning. With regard to L2 vocabulary, mixed results are found, with some studies finding that there is a positive effect of music on vocabulary size, while others found no relation. However, since newly acquired

lexical items are stored in WM, and WM being trained by music, one would expect a positive relation between music and vocabulary learning and retrieval. Indirectly, it has been found that language learning increases when learners have greater attention and more positive emotions during learning experiences, and when input is repetitive. Since musical cues carry these factors more than language, it is expected that English musical exposure will yield greater learning outcomes.

If this proposal is conducted, it will fill gaps in the literature with regard to music and L2 reading development; music and L2 vocabulary development; and the interface between reading and listening among young L2 learners. The findings could likely be generalised over young learners of English in primary education. If the outcomes were to be positive, changes in current primary schools' curricula would be recommended and musical exposure in in-class learning environments would be encouraged.

Future research could be extended on the current intervention. It would be interesting to look if the onset of English and/or music lessons in school influences the efficiency of the music intervention on vocabulary and reading acquisition. Similarly, the relation between different genres of music on learning outcomes could be further studied. Additionally, as mentioned in section 3, future research could focus on differences in the efficiency of musical exposure in different linguistic environments.

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Appendices

Appendix A) Survey.

Engels en Muziek op de basisschool (Scriptie)

Beste,

Deze enquête gaat over Engels en muziek op de basisschool. De bedoeling is dat u de vragen beantwoordt op basis van hoe het op de school gaat waar u werkzaam bent (geweest). De enquête is bedoeld om mij te helpen met het onderbouwen van de keuzes in de methodologie voor mijn scriptie. Het duurt hooguit 5 minuten en uw antwoorden en identiteit blijven uiteraard anoniem. Bij voorbaat dank voor uw deelname.

1. *Hoe bent u betrokken bij het basisonderwijs? Selecteer één antwoord.*

Ik ben momenteel leraar op een basisschool

Ik heb een andere functie in het basisonderwijs, namelijk [...]

2. *Wat geldt voor de basisschool waar u momenteel werkt? Selecteer één of meerdere antwoorden.*

Openbaar

Montessori

Christelijk

Dalton

Islamitisch

Tweektalig onderwijs

Katholiek

Anders, namelijk [...]

3. *Hoeveel kinderen zitten er in groep 8 op de school waar u werkzaam bent?*

4. *Vanaf welke groep wordt er Engels gegeven op de school waar u werkzaam bent? Selecteer één antwoord.*

Groep 1/2

Groep 6

Groep 3

Groep 7

Groep 4

Groep 8

Groep 5

5. *Hoeveel Engels lessen krijgen de kinderen in groep 8 per week? Selecteer één antwoord.*

1 les

3 lessen

2 lessen

4 of meer lessen

6. *Hoeveel minuten duurt gemiddeld één Engelse les in groep 8 op uw school?*

7. *Hoeveel minuten per week komen kinderen in groep 8 gemiddeld in aanraking met de Engelse taal bij u op school? Incl. de Engelse les.*

8. *Wat zijn de voornaamste lesdoelen van Engels in groep 8?*

Denk bijvoorbeeld aan het leren van nieuwe woorden, het kunnen begrijpen van de taal, lezen, het verstaanbaar kunnen maken in het Engels, etc.

9. *Wordt de Engelse taal in andere lessen gebruikt?*

Denk bijvoorbeeld aan videomateriaal, muziek, spelletjes, etc.

Nee.

Ja, namelijk door/via [...]

10. *Welke taal spreekt de leraar tijdens de Engelse les? Selecteer één antwoord.*

Alleen Nederlands

Voornamelijk Nederlands, soms Engels

Voornamelijk Engels, soms Nederlands

Alleen Engels

11. *Welke taal spreken de kinderen tijdens de Engelse les? Selecteer één antwoord.*

Alleen Nederlands

Voornamelijk Nederlands, soms Engels

Voornamelijk Engels, soms Nederlands

Alleen Engels

12. *Hoeveel minuten per week lezen kinderen in groep 8 gemiddeld? In het Nederlands en evt. andere talen.*

13. *Lezen de kinderen in groep 8 in het Engels op school? En zo ja, hoeveel minuten lezen zij gemiddeld in het Engels per week?*

14. *Wordt er op uw school muziekles gegeven? En zo ja, vanaf welke groep?*

15. *Wat zijn de voornaamste lesdoelen van muziekles in groep 8?*

Denk hierbij bijvoorbeeld aan samen zingen, het bespelen van een instrument, het leren lezen van noten, etc. Indien er geen muziekles wordt gegeven mag u “n.v.t.” invullen.

16. *Hoeveel minuten per week komen de kinderen in de klas gemiddeld in contact met muziek?*

Denk bijvoorbeeld aan videoclips, muziek in andere lessen en/of pauzes. Incl. eventuele muziekles.

17. *Met welke reden wordt muziek in de klas gebruikt? Selecteer één of meerdere antwoorden.*

Vermaak/Plezier

Verduidelijken van lesstof

Motiveren van kinderen/Aandacht vergroten

Er wordt geen muziek gebruikt

Anders, namelijk [...]

Appendix B) Lesson plan

Lesson plan

Subject: English	Group: Groep 8 (grade 6); experimental group only	
Learning goals:		
a) using music in English class to facilitate language learning processes, with focus primarily on vocabulary acquisition and the development of L2 reading skills.		
b) stimulating reading development through music: it is expected that children will perform better at the reading post-test than on the pre-test.		
c) stimulating vocabulary acquisition through music: it is expected that children will perform better at the vocabulary post-test than pre-test.		
Sessions: 18 sessions, once a week before each English lesson	Intervention duration: 18 weeks, i.e. 4,5 months	Session duration: 10 to 15 minutes each, i.e. three songs per session
Activity		
Students: a) actively listen to the three songs prior to the actual lesson. When songs are familiar, engagement could be shown with humming, singing, etc. b) answer questions the teacher provides between and after songs.	Teacher: a) engage children in listening to the songs, encourage participation (e.g. humming, singing, dancing). b) after each individual song, ask whether children knew the song, if they liked it, and other questions that checks on active participation. c) after each session, ask children which songs they liked the most.	
Materials		
Week 1		
Song	Duration	
1) <i>Uptown Funk</i> – Mark Ronson ft. Bruno Mars	4 min., 30 sec.	
2) <i>Girls Just Want to Have Fun</i> – Cyndi Lauper	3 min., 58 sec.	
3) <i>God Only Knows – Remastered</i> – The Beach Boys	2 min., 53 sec.	
	Total: 11 min., 21 sec.	
Week 2		
Song	Duration	
1) <i>Call Me Maybe</i> – Carly Rae Jepsen	3 min., 13 sec.	
2) <i>We Found Love</i> – Rihanna ft. Calvin Harris	3 min., 35 sec.	
3) <i>bad guy</i> – Billie Eilish	3 min., 14	
	Total: 10 min., 2 sec.	
Week 3		
Song	Duration	
1) <i>Sun</i> – Two Door Cinema Club	3 min., 8 sec.	
2) <i>Shake it off</i> – Taylor Swift	3 min., 39 sec.	
3) <i>Livin' On a Prayer</i> – Bon Jovi	4 min., 9 sec.	
	Total: 10 min., 56 sec.	
Week 4		
Song	Duration	

1) <i>Don't Start Now</i> – Dua Lipa	3 min., 3 sec.
2) <i>Single Ladies (Put a Ring on It)</i> - Beyoncé	3 min., 13 sec.
3) <i>Billie Jean</i> – Michael Jackson	4 min., 54 sec.
Total: 11 min., 10 sec.	
Week 5	
Song	Duration
1) <i>Rolling in the Deep</i> - Adele	3 min., 48 sec.
2) <i>Wild World</i> – Mr. Big	3 min., 29 sec.
3) <i>Closer</i> – The Chainsmokers	4 min., 5 sec.
Total: 11 min., 22 sec.	
Week 6	
Song	Duration
1) <i>Wake Me Up</i> - Avicii	4 min., 07 sec.
2) <i>Somebody That I Used to Know</i> – Gotye ft. Kimbra	4 min., 06 sec.
3) <i>Counting Stars</i> - OneRepublic	4 min., 17 sec.
Total: 12 min., 30 sec.	
Week 7	
Song	Duration
1) <i>Shape of You</i> – Ed Sheeran	3 min., 54 sec.
2) <i>Malibu</i> – Miley Cyrus	3 min., 52 sec.
3) <i>What Do You Mean?</i> – Justin Bieber	3 min., 26 sec.
Total: 11 min., 12 sec.	
Week 8	
Song	Duration
1) <i>Somewhere Only We Know</i> - Keane	3 min., 57 sec.
2) <i>Work From Home</i> – Fifth Harmony ft. Ty Dolla \$ign	3 min., 34 sec.
3) <i>In the Name of Love</i> – Martin Garrix ft. Bebe Rexha	3 min., 16 sec.
Total: 10 min., 47 sec.	
Week 9	
Song	Duration
1) <i>Story of My Life</i> – One Direction	4 min., 5 sec.
2) <i>Dear Future Husband</i> – Meghan Trainor	3 min., 4 sec.
3) <i>Ordinary People</i> – John Legend	4 min., 41 sec.
Total: 11 min., 50 sec.	
Week 10	
Song	Duration
1) <i>Here Comes The Sun – Remastered 2009</i> – The Beatles	3 min., 06 sec.
2) <i>This Life</i> – Vampire Weekend	4 min., 29 sec.
3) <i>Poker Face</i> – Lady Gaga	3 min., 57 sec.
Total: 11 min., 34 sec.	
Week 11	
Song	Duration
1) <i>Take on Me</i> – a-ha	3 min., 45 sec.
2) <i>Adore You</i> – Harry Styles	3 min., 27 sec.
3) <i>no tears left to cry</i> – Ariana Grande	3 min., 26 sec.
Total: 10 min., 38 sec.	
Week 12	
Song	Duration
1) <i>Yellow</i> - Coldplay	4 min., 27 sec.

2) <i>Dance Monkey</i> – Tones And I	3 min., 29 sec.
3) <i>Treat You Better</i> – Shawn Mendes	3 min., 8 sec.
	Total: 11 min., 4 sec.
Week 13	
Song	Duration
1) <i>Havana</i> – Camila Cabello ft. Young Thug	3 min., 37 sec.
2) <i>Uptown Girl</i> – Billy Joel	3 min., 18 sec.
3) <i>Don't Dream It's Over</i> – Crowded House	3 min., 58 sec.
	Total: 10 min., 53 sec.
Week 14	
Song	Duration
1) <i>Broken Strings</i> – James Morrison ft. Nelly Furtado	4 min., 10 sec.
2) <i>Love Me Like You Do</i> – Ellie Goulding	4 min., 13 sec.
3) <i>Boys Don't Cry</i> – The Cure	2 min., 36 sec.
	Total: 10 min., 59 sec.
Week 15	
Song	Duration
1) <i>Sugar</i> – Maroon 5	3 min., 55 sec.
2) <i>Don't You Worry Child</i> – Swedish House Mafia	3 min., 33 sec.
3) <i>Be My Baby</i> – The Ronettes	2 min., 41 sec.
	Total: 10 min., 9 sec.
Week 16	
Song	Duration
1) <i>Blinding Lights</i> – The Weeknd	3 min., 20 sec.
2) <i>Don't Stop Me Now – Remastered 2011</i> - Queen	3 min., 29 sec.
3) <i>Gimme! Gimme! Gimme! (A Man After Midnight)</i> - ABBA	4 min., 53 sec.
	Total: 11 min., 42 sec.
Week 17	
Song	Duration
1) <i>Arcade</i> – Duncan Laurence	3 min., 5 sec.
2) <i>I'm Ready</i> – Sam Smith ft. Demi Lovato	3 min., 21 sec.
3) <i>I Want It That Way</i> – Backstreet Boys	3 min., 34 sec.
	Total: 10 min., 0 sec.
Week 18	
Song	Duration
1) <i>Kiss me</i> – Sixpence None The Richer	3 min., 29 sec.
2) <i>Happy</i> – Pharrell Williams	3 min., 35 sec.
3) <i>Junk Of the Heart (Happy)</i> – The Kooks	3 min., 07 sec.
	Total: 10 min., 11 sec.