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DOI:

[10.1177/02724316211020368](https://doi.org/10.1177/02724316211020368)

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*Document Version*

Peer reviewed version

*Citation for published version (Harvard):*

Mitmann, G, Woodcock, K, Dörfler, S, Krammer, I, Pollak, I & Schrank, B 2021, “TikTok is my life and SnapChat is my ventricle”: a mixed-methods study on the role of online communication tools for friendships in early adolescents’, *The Journal of Early Adolescence*. <https://doi.org/10.1177/02724316211020368>

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“TikTok is my Life and SnapChat is my Ventricle” – A Mixed-Methods Study on the Role of  
Online Communication Tools for Friendships in Early Adolescents

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### **Abstract**

Early adolescents are frequent users of online communication tools (OCTs). Yet, we have limited knowledge about how OCTs influence this population in their friendships. We sought opinions of 938 Austrian early adolescents on the role of OCTs for their friendships via a questionnaire and 207 focus groups. Thematic analysis was used to analyse the focus groups. We found that despite the emergence of some online-specific aggression, OCTs are perceived as beneficial for friendships. Early adolescents use online spaces naturally and differentiate little between online and offline communication. Only when it comes to high levels of intimacy, early adolescents also need an offline setting to fulfil the communication need. Online communication tools, especially newer forms such as online gaming, can surpass a mere communicative function and provide a space for building and maintaining friendships. In the future, OCTs should be considered as a tool to endorse positive development in early adolescents.

*Keywords:* Friendship, academic/school transitions, communication, media & technology, peer relationships

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Online communication tools (OCTs), including instant messaging (IM; chat services) and social networking sites (SNSs; sites for posting photos, videos, stories, etc.) are an almost ubiquitous facet of adolescents’ lives in both the US (Rideout et al., 2010) and European countries (Tsitsika et al., 2014). Apart from IM and SNSs, the rapidly evolving world of online games offers new ways to experience social interactions online by grouping in games (e.g. World of Warcraft) or playing as a team against other teams (e.g. League of Legends or Fortnite) whilst communicating directly with fellow players or entire teams. Thus, today’s users have a variety of different types of OCTs with differing features at their disposal.

As usage starts at an ever younger age (Lenhart et al., 2010), in this paper we specifically focus on the age at which online communication starts to become an important tool (Antheunis et al., 2014), i.e. early adolescence (broadly considered 10-14 years). This time of transitioning from childhood to adolescence is a complex phase that not only includes physical and cognitive changes but is marked by the emerging importance of social interactions and relationships outside the family (Valkenburg & Piotrowski, 2017). Since the current generation of early adolescents was born into a highly digitalized world, which allows constant social connection without physical proximity, it is critical to understand the role of digital technology for social relationships in this age group.

## **Friendships and Peer Relations**

### ***Early Adolescence***

Psychosocial development advances rapidly during adolescence, affecting identity, intimacy, and sexuality (Erikson, 1963; Valkenburg & Peter, 2011) and making early adolescents particularly prone to influences from peers. As children get older, desire for conformity with

parents moves towards striving for conformity with peers (Berndt, 1979). Friends become the reference for social norms and values and peer pressure to fit in can make adolescents change (Steinberg & Monahan, 2007) and increase the likelihood of risk taking (Gardner & Steinberg, 2005). This might be driven by the fact that early adolescents think of popularity and status enhancement as top priorities when it comes to relationships (LaFontana & Cillessen, 2010). For example, friends are a key factor influencing a person's alcohol and drug use (Sieving et al., 2000) or academic achievement during adolescence (Wentzel et al., 2004). Poor peer relations in this age group are related to social anxiety and depression (Borowski et al., 2018; La Greca & Harrison, 2005; La Greca & Lopez, 1998) or loneliness (Lodder et al., 2017). On the positive end of the spectrum, reciprocal friendships are connected to prosocial behaviour (Wentzel et al., 2004; Wentzel & Caldwell, 1997), resilience (Van Harmelen et al., 2017), or well-being (Cuadros & Berger, 2016). Friendship experiences during early adolescence also predict future outcomes such as academic achievement (Loeb et al., 2019) or romantic relationships (Loeb et al., 2018).

### ***Offline Friendships***

In traditional friendship development, various determinants predict friendship formation, most importantly homophily, i.e. the attraction between people who are alike. This includes sex, age, and race (Brown & Klute, 2003; Burk et al., 2007; Hafen et al., 2011; Knecht et al., 2011) but also similar interests (Franken et al., 2016) and physical proximity (Preciado et al., 2012). Friendship development traditionally undergoes various phases with increasing reciprocated self-disclosure, intimacy, support, and closeness (Altman & Taylor, 1973; Johnson et al., 2003; Reis & Shaver, 1988).

Nowadays, children's and adolescents' development is closely intertwined with digital media (Gerwin et al., 2018). Thus, friendships should also be considered in relation to these. Given the importance of communication in social interactions and friendships (Arroyo & Segrin,

2011) and the emergence of OCTs as central tools of communication during early adolescence, this study focuses on OCTs specifically, excluding other forms of digital technology such as television.

### ***Online Friendships***

Online interactions provide a number of different features as opposed to traditional communication settings such as constant and asynchronous accessibility of content, the possibility of posting to a large (even unknown) audience, the emergence of “likes” and similar features as a form of validation, and a new visual focus (with the absence of physical cues but a focus on photos and videos; Nesi et al., 2018). Consequently, a number of theories have been proposed to describe the impact of online communication on social interactions and friendship development. While some assume negative consequences of such communication because people spend less time face-to-face with existing friends (Nie, 2016), others purport that friendships are strengthened because of additional time spent online (in contact) with friends (Valkenburg & Peter, 2007a), enhancing social connectedness, belonging, and consequently wellbeing (Bourgeois et al., 2014). High OCT activity level has been associated with a high face-to-face communication level and online communication can even increase (Dienlin et al., 2017) or exceed (Walther, 2016) face-to-face communication.

Previous research has suggested that different coexisting interpersonal media tools occupy different specific roles and niches (Dimmick et al., 2011; Dimmick et al., 2016) and different OCTs are arguably used according to the level of friendships (Yang et al., 2013). However, this work has focused on older media (landline telephone, email; Dimmick et al., 2011) and specific populations (socially isolated; Chan, 2020).

It seems likely that online communication has different effects on different individuals. However, the nature and scope of the effects on adolescent friendships have so far received little

attention in research, especially from the perspective of early adolescence, when the role of social relationships is critical for strong relationships over the life course, mental health, and wellbeing. Research has so far focused mainly on the use of OCTs in older adolescents and adults (e.g. Anderson & Jiang, 2018; Lee, 2009; Subrahmanyam & Greenfield, 2008; Tsitsika et al., 2014), with limited knowledge when it comes to early adolescents.

In a recent literature review about adolescents' psychosocial development and SNS use (Shapiro & Margolin, 2014), only 5 out of 27 studies included adolescents under the age of 13, and only one study (Quinn & Oldmeadow, 2013) looked specifically into young adolescents aged 9-13. Literature focusing on early adolescents still yields varying results concerning OCTs' positive or negative impacts (e.g. Vannucci & Ohannessian, 2019). Furthermore, research on friendship has largely neglected to examine the whole social online experience including IM, SNSs and online gaming, which is particularly relevant given the increasing trend of online gaming. Little is known about how similarities or differences between different types of OCTs with their distinct features might be connected to friendships in early adolescents as most existing studies examine only one of these types.

### **The Present Study**

The present study aims to examine early adolescents' perspectives on OCT use and its relationship to their offline and online friendships; analysing both qualitative and quantitative data. Qualitative and mixed-methods approaches are valuable to gather specific information about a topic as broad and ever-changing as the internet (Davis et al., 2019). Since parents are often ignorant about their children's internet behaviour (Livingstone, 2016), data can provide valuable information when coming from children themselves. There has been little focus on early adolescence when it comes to OCT use and the existing literature often uses self-report questionnaires or looks at specific online behaviour such as Facebook posts (Peter et al., 2006;

Shapiro & Margolin, 2014; Valkenburg & Peter, 2007b). Qualitative approaches such as focus groups are still rare.

Thus, the lack of investigations in this age group makes it hard to identify what is important to the social lives of modern adolescents when they use different types of existing OCTs. The current study seeks to identify key features of OCTs that drive adolescents' interest, engagement and need fulfilment when it comes to social relationships and friendships. Yet, as this was an exploratory study, we did not formulate hypotheses. We took sex differences into account in the quantitative analysis, given that research shows substantial developmental changes during the time of early adolescence and the onset of puberty, sexuality, and interest in gender (e.g. Miller et al., 2012), as well as the documented sex differences existing in OCT use, including IM (Fox et al., 2007) and especially online gaming (Veltri et al., 2014).

## **Methods**

### **Participants**

Children from last year of primary and first year of secondary school were recruited in two ways: First, the Department of Education of Lower Austria recommended potentially interested schools. Second, we advertised the project at all schools in Lower Austria via leaflets (paper and email), media presence, and teacher training events. Whole classes of schools participated in a one-time workshop on a voluntary basis but were purposefully chosen to represent a wide range of socio-demographic and educational backgrounds, i.e. all types of schools (primary schools, Austrian equivalents for secondary schools, i.e. Neue Mittelschule and Gymnasium, and special needs schools); different school sizes; rural, suburban and urban areas; and a varying proportion of pupils with a migration background. This study also served the purpose to build relationships with schools to include them in later co-development activities for interventions based on the results of this study. Hence, we did not turn away interested schools,



which led to a higher than scientifically necessary sample size. Parents of all pupils provided signed parental consent. Overall, 54 workshops with 207 focus groups were conducted between September 2018 and December 2018, with a total of 906 completed questionnaires. Additionally, the questionnaire was handed to another two classes during a series of workshops in March 2019. Due to missing variables, 22 questionnaires had to be excluded from the analysis, resulting in 938 participants ( $M_{\text{age}} = 10.48$ ,  $SD = .93$ ) in total. Some pupils older than the targeted age group were accepted due to the inclusion of whole classes and special need schools. For full description of the demographics, see table 1.

~Table 1 about here~

## **Procedure**

The study was approved by the ethics committee [withheld for blind review] (EK-Nr. 10/2018), which covers research in Lower Austria and all data was anonymized for analysis.

The workshop parts analysed for this paper were part of bigger one-time workshops conducted with school classes that covered topics of school transition, friendships, emotions, and the role of social media (which is the part discussed in this paper). The workshops were advertised as a session providing opportunity to discuss children's experiences during the transition period from primary to secondary school. A full workshop lasted 2 hours (including the parts analysed in this paper) and was held during school hours. Each school class only participated in one workshop. The workshop parts analysed for this paper included a qualitative focus group (10-15 min) and a quantitative questionnaire (5-10 min). Both parts evolved slightly over the course of the study according to insights in feasibility and acceptability gained along the way. Initial workshops included open discussions about topics that came to children's minds. After identifying the most relevant topics, specific prompts and questions were formulated for

subsequent workshops. This is an established procedure in qualitative research (Willig & Rogers, 2017).

### ***Focus Groups***

Group size in the focus groups ranged between 3 and 6 pupils and were each led by a trained facilitator. Participants were encouraged to form groups themselves to maximise willingness to disclose and participate. The discussion was started with a picture prompt, since “stimulus material” can successfully facilitate communication (Fargas-Malet et al., 2010). The picture consisted of the logos of nine well-known online applications with communication functions (Facebook, WhatsApp, Twitter, Instagram, Snapchat, TikTok, Fortnite, Pokémon Go, and Minecraft). If needed, discussion was initiated with an open question about usage of these apps. Topics of interest that were identified during the first workshops included the general use of OCTs, experiences during OCT use, advantages and disadvantages of OCT use, and OCTs in relation to friendships, but prompts focussing on these topics of interest were only used when they were needed to facilitate discussion. Frequently discussed topics and corresponding questions asked by the facilitators are shown in table 2. With this procedure, we ensured that important topics would not be dismissed by restricting discussion to a preconceived structure and that pupils were allowed to talk about any topic important to them in relation to OCTs.

~Table 2 about here~

### ***Questionnaire on Online Communication Tool Usage***

After the focus group, participants were handed an author-designed questionnaire about OCT use. The questionnaire was piloted in the first workshops and refined to improve acceptability (e.g. more pictures) and usability (e.g. skipping or reformulating questions to improve comprehensibility). Questions that were changed slightly were merged with the adapted questions in the analysis, questions that were only asked during pilot sessions were not included

in the analysis. Participants filled out the questionnaire individually. Facilitators gave verbal instructions in line with the needs of pupils. The questionnaire covered demographic information, used applications, and information about when, where, how long, and with whom early adolescents use these applications (see table 3; see supplementary material for full questionnaire).

~Table 3 about here~

## **Data Analysis Plan**

### ***Quantitative Analysis***

Quantitative data was analysed with IBM SPSS Statistics for Windows, version 24 (IBM Corp., Armonk, N.Y., USA). Descriptive statistics and chi-square tests were conducted for groups (boys and girls; primary and secondary school; different age) and relevant outcome variables of the questionnaire.

### ***Qualitative Analysis***

Qualitative data was analysed with the QSR International's NVivo 12 qualitative data analysis software (QSR International Pty Ltd, 2018). Workshop notes were transferred to the software. We applied a reflexive thematic analysis (Braun & Clarke, 2006) to the qualitative data, enhanced by methods taken from grounded theory (including iterative inductive coding, line-by-line coding, and constant comparison; Tan, 2010) and supplemented by methods taken from content analysis (visualisation using counting of mentions and descriptive statistics; Morgan, 1993). Thematic analysis was used because it is not guided by pre-existing theoretical assumptions and (used in a realist way) describes experiences and the reality of participants (Braun & Clarke, 2006), which fits the aims of this study. Themes were found on a semantic, individual level, meaning we looked for surface meaning of the data rather than latent themes. Only content related to friendship was included in this paper. After reviewing and becoming familiar with the data, initial inductive coding led to the broad codes as described below. The

initial broad themes were further line-by-line coded into more fine-grained descriptive themes and subthemes, clustered and re-clustered in an iterative process. Two independent coders coded all data and resolved any discrepancies (e.g. collapsing overlapping themes, separating distinct themes) by consensus in repeated discussions together and with a senior researcher.

### **Quantitative Results**

Quantitative results show that overall, almost 90% of participants use their mobile phones “very often”, making it their key device for communication. It is also the only device that the majority (72%) brings to school, even though most participants (86%) report that mobile phone use is not allowed during school time. There is a significant increase in mobile phone use between 9 and 10 years of age, which marks the most common age for school transition in Austria. At the age of 13, only 3% do not use a mobile phone “very often”. WhatsApp is by far the most favourite communication app, followed by TikTok and Instagram. WhatsApp is also the most popular tool to interact with friends and peers. For full details of favourite applications separated by age and gender, see table 4. Use of OCTs with their best friends increases significantly between 9 and 10 (33% vs. 57% high usage,  $p < .001$ ), with a steady further rise in the years thereafter. In general, 47% report spending “much or very much time” on digital devices together with friends, with boys reaching higher values than girls and 43% report to be in contact with people they have never met in real life. Overall, only 12% report not playing any games on their phones. Girls play less than boys (17% vs. 9%,  $p < .001$ ) and percentages significantly decrease between primary and secondary school (17% vs. 12%,  $p = .048$ ). The top 3 games are Minecraft, Fortnite, and Helix Jump.

~Table 4 about here~

### **Qualitative Results**

For the qualitative analysis, we categorized different OCTs according to their main motive for their usage: *Instant messaging (IM)* within a network of friends, closely resembling real-life communication (e.g. WhatsApp), *social networking sites (SNSs)* that are about public communication/posting (e.g. TikTok), and apps that are about *gaming*, where communication is a secondary feature (e.g. Fortnite). Notably, some of the applications also comprise features of the other types such as both private and public chat functions. These types were considered within most of the themes. Seven meaningful themes were identified. The structure and definitions of the main themes can be found in table 5.

~Table 5 about here~

### **Theme 1: Value of a Phone and Online Communication Tools**

The possession of a phone and access to OCTs is deemed important for the majority of early adolescents, especially for friendships, which can be seen for all types of OCTs (Fig. 1).

*“It [Fortnite] helps with friendships, because you do something together and talk.”*

*“Friendships are strengthened by sending videos.”*

*“It [WhatsApp] helps with our friendships, because we are more closely connected.”*

In general, IM is the most used and most talked-about type of OCTs, followed by gaming and SNSs. Gaming is the most controversial category when it comes to importance, with approximately one third of opinions deeming it not important for friendships.

Peer connectedness is the main motive for usage. Mostly, early adolescents reason that they use OCTs together with their friends, and not having a phone could lead to social exclusion. For example, some early adolescents are not allowed to use WhatsApp as it requires a minimum age of 16 in the EU. Yet, the majority of early adolescents uses WhatsApp, thus without this application they miss conversations, which might cause problems for connecting with friends.

*“I am not allowed to use it [WhatsApp]. It is only allowed from the age of 16. I don’t understand why people use it. Legally, that is not allowed. I use Telegram, one can [legally] use it at my age and it’s the same as WhatsApp.”*  
 Facilitator: *“And how do you use that?”*  
*“I use it to write with my parents. My friends don’t have it, which is stupid, they use WhatsApp, even though it is not allowed.”*

~Figure 1 about here~

## **Theme 2: Asynchronicity**

One major advantage of OCTs for early adolescents is asynchronicity, which means that they can connect and stay in contact with friends and family all the time, including people who are geographically far away, as well as the possibility to reach people at any time. Examples are friends who are on holiday, relatives who live far away, divorced parents, or friends from former schools. Asynchronicity is most prominently mentioned in relation to IM in our sample.

*“During holidays or if you can’t see each other and you miss each other, then you write.”*

*“I know someone, he changed school in the second grade of elementary school and we still write, even though we haven’t seen each other for three years.”*

Yet, expectations for interaction partners are high – in some rare but extreme cases, not replying to messages whilst online might end a friendship.

*“If someone doesn’t reply to my message instantly, I get angry.”*

## **Theme 3: Emotions**

A variety of emotions were discussed with respect to OCTs. The most prevalent negative emotions are anger and fear, while the most prevalent positive emotion is a general feeling of well-being (*“then I feel great!”*). There is a difference between emotions that occur *because of* OCT use (e.g. anger because of a lost game, fear of chain letters) or *while* using OCTs (any emotion that is related to offline life). A variety of regulatory strategies to avoid or overcome negative feelings during OCT use were discussed, such as leaving groups that elicit stress or blocking people. On the other hand, OCTs are also actively used as a regulatory resource (e.g. using WhatsApp to talk about something sad that happened that day, making a video to overcome

a feeling of sadness, or alleviating boredom). While early adolescents often described using IM and SNSs to overcome negative emotions, they tended to relate gaming to positive emotions such as well-being and happiness. Anger seems to be most relevant during IM and gaming (see also theme 6).

*“You can calm down and get rid of stress by writing.”*

*“When I’m bored, it’s great to write with someone [on Whatsapp].”*

*“You have all this adrenaline when you play [Fortnite] well – then you’re in a good mood!”*

#### **Theme 4: Level of Intimacy**

Various topics with different levels of intimacy are discussed via OCTs, i.e. organizational purposes (e.g. dates, homework), lightweight messages (e.g. funny videos, small talk), self-expression (posting behaviour) and intimate topics (e.g. secrets, feelings). Figure 2 shows the distribution of topics according to OCT categories (IM, SNSs, gaming).

*“You can meet at the playground and schedule that [via WhatsApp].”*

*“Me and my friend write stupid messages [...].”*

*“When I build something out of wood, I take pictures and post them [on Facebook].”*

*“When you’re sad, you can write why you’re sad [on SnapChat] and then the other person can comfort you.”*

A lot of early adolescents have IM groups (especially on WhatsApp) solely for organizational purposes (e.g. a group to organize Minecraft-dates or a group for the volunteer fire department). Additionally, OCTs provide room for lightweight messages that centre around topics such as updates of daily activities, small talk, or funny contents. Early adolescents use a variety of media tools such as videos, photos, GIFs, or emojis, to convey a message. Emojis seem to be necessary for expressing various emotions and prevent misunderstandings. Hence, they are also of particular importance when discussing intimate topics.

*“When I write a message [on WhatsApp], I cannot explain my feelings. I use them [emojis] to express my feelings.”*

Ways of self-expression can be divided into three subthemes: only looking at other profiles, posting privately, and posting publicly. Self-expression is an often-mentioned reason for early adolescents to use OCTs, specifically SNSs. Yet, it seems that the need for reassurance through likes and general appreciation is only starting to show at this age. Most early adolescents are happy to only look at other profiles (Instagram) or videos (YouTube) or post and share privately and for friends, with a smaller number being concerned about public self-representation. Famous youtubers and influencers on Instagram play an important role for early adolescents when following other people.

During gameplay, early adolescents communicate in various ways. Gaming apps themselves (e.g. Fortnite) have a chat function, but early adolescents also speak with each other via programs such as Discord or TeamSpeak while playing. Others only report a very basic level of communication during gameplay, for example by sending signs in Minecraft, or performing dances in Fortnite. Communication during gameplay mostly revolves about in-game-organization (what to do, where to go, where the enemies are), but when playing with friends, early adolescents also talk about school and even intimate topics.

~Figure 2 about here~

Early adolescents have differing opinions when it comes to the question of whether they prefer online or face-to-face communication and the topics they would discuss. For example, some would rather have a girl/boyfriend break up with them in person than via WhatsApp, others say it is easier to talk about difficult topics when they are not face-to-face. Early adolescents only talked about intimate topics, but while some would rather talk about secrets, arguments, or relationship-topics face-to-face, others prefer to do it via OCTs.

*“I wouldn’t write about secrets [on WhatsApp]! That’s not secure.”*

*“Some things are easier conveyed via WhatsApp.”*

*Facilitator: “What things exactly?”*



*“Could be anything, secrets for example.”*

### **Theme 5: Offline and Online Fusion**

Most of the OCTs and SNSs are used to communicate with friends online, but they can also be used with friends while being together in real-life. Especially games such as Fortnite or Minecraft often lead to real-life interactions, because early adolescents meet up to play the games together. The same applies to other applications used with friends to have a good time. A lot of early adolescents do not actively post for a broader audience but enjoy looking at other peoples' profiles or taking pictures together with their friends. Notably, this fusion primarily happens during online gaming and with SNSs, while IM (even though the most used type of OCTs) received almost no mentions in this theme.

*“I play [Minecraft] with the other children of the shared flat, they say “Careful, a trap!” or something similar, they help me. They sit next to me.”*

### **Theme 6: Aggression and Arguments**

There were only few accounts of bullying in our sample, yet, general aggressiveness (e.g. writing curse words) was a prominent topic, as was gaming toxicity (aggressive behaviour during gameplay, usually someone is blamed for the loss), and so-called ‘hates’ (insulting comments below posted photos). Arguments via chat (e.g. WhatsApp) are common but are reported to be usually settled when meeting again in real life. A distinction can be made between fights that happen *while* using an online device, or *because* of using it. Arguments from the first category can be about any topic and are sometimes fuelled by misunderstandings or misinterpretations of the writing but are likely to be solved during real-life interactions.

*“It [WhatsApp] is not like in real life, because you can often misunderstand something.”*

The other category of arguments can be found especially during gaming, when one person (accidentally or intentionally) kills the other person in-game or does not help the other person.

These arguments can spill over into real-life interactions, in the worst case resulting in the dissolution of the friendship.

*“When you accidentally kill someone [during Fortnite], then they are angry, they don’t play with me anymore.”*

### **Theme 7: Friendship Level – Strangers, Dyadic Interactions, and Groups**

We found that OCTs are used with strangers, in dyadic friendships, in small friendship groups, and in bigger peer groups. While dyadic friendships and small friendship groups are most common and have been covered in this paper already, strangers and peer groups will be described in more detail here.

The majority of contact with strangers is purely online and never results in a face-to-face meeting. Gaming is the main tool to interact with strangers. Some early adolescents have not met their online friends for real but plan to do so in the future. Early adolescents from our sample who met online friends personally do not report any negative experiences.

*“I also play [Fortnite] with other people.”*

*Facilitator: “And do you also meet them in person?”*

*“Yes, I have met them in person.”*

*Facilitator: “How did that happen?”*

*“I asked: ‘Where do you live?’, and then we met and became friends.”*

Yet, some early adolescents are worried about the identity of strangers who they interact with on online devices and ignore unwanted contact or report them to their parents. It seems that early adolescents are highly aware of the potential dangers of anonymity (e.g. they talk about abduction), yet, they also seem confident that they will identify dangerous people through various tactics such as checking if the other person disguises their voice or asking a lot of questions, so the person might reveal themselves. Sometimes, the “strangers” early adolescents befriend online are in reality people they already know but have not been friends with before.

*“I only saw him passing and in gym class, he’s in the other school class. But we weren’t friends before. Now we are.”*

There are several common group compositions in OCTs such as groups centring around a specific activity (e.g. Fortnite) or gender-specific groups. One special form of peer group use is “class WhatsApp groups” including (more or less) all pupils of one class. While it is acknowledged that it makes organizing easier, the flood of messages received is seen as an important disadvantage. Most early adolescents emphasize the negative aspects of class WhatsApp groups, such as redundant content (e.g. everyone says “good morning”), or topics that are too specific for all (e.g. Fortnite). Leaving the class WhatsApp group due to these disadvantages is a common phenomenon, making OCT use in large peer groups least attractive.

*“The [WhatsApp] class group is always being misused by the boys to write stupid stuff.”*

### **Discussion**

This study used a mixed-method approach to discover meaningful themes of early adolescents’ perspectives on OCT use and its relationship to their offline and online friendships. We found that the time of early adolescence and especially the time of school transition matches the time when OCT use starts to become increasingly important for interpersonal reasons: Different tools are used to fulfil different social needs and communication using these tools differs in terms of intimacy.

### **Need Fulfilment**

Our analysis of early adolescents’ OCT use confirms that such tools are already essential in this age group. Our quantitative analysis revealed that most early adolescents start using phones and related communication applications when transitioning to secondary school (age 10-11). A lot of pupils seem to get their first own phone at that age and start using it extensively. Early adolescents in our sample mostly use OCTs for connecting with their friends. This is in line with research about OCT use in older adolescents, where peer relations are a key motivational factor for usage (Throuvala et al., 2019), and supports the fact that OCTs and friendships are

closely connected. We did not find any indications that OCT use has a general negative impact on friendships of early adolescents, extending findings from Antheunis et al. (2014) about SNS use. Even though we did not explicitly ask for opinions on friendship quality, results from our sample support the positive relation between OCT use and friendship quality (Antheunis et al., 2014; Valkenburg & Peter, 2007a) due to the extensive use of OCTs with friends. Additionally, a lot of OCTs are not used only for communication, but as a tool during offline interaction (taking pictures for Snapchat, playing Fortnite together in the same room).

Different OCTs were found to fulfil different needs in early adolescents. In general, all OCTs are used to ensure peer connectedness and peer acceptance, but in alignment with Valkenburg and Peter (2007b), we also found differences in the type of OCTs, with IM being more important for friendships than SNSs. Our findings also extend previous findings concerning different roles of OCTs (Dimmick et al., 2011; Dimmick et al., 2016) to more recent forms of media in a general population, but with similar results: IM is used primarily with friends discussing a variety of topics, while games can be played with friends and strangers alike, with less communication that exceeds organizational topics. Hence, while IM resembles offline communication, gaming can be better described as resembling offline interactions. This is accentuated by the fact that online and offline fusion happens almost exclusively during SNS use and gaming, which in turn can be explained by the fact that these types have features that surpass a simple communicative purpose (e.g. playing, photos/videos). In a recent meta-analysis, Liu and Yang (2016) found that IM, SNSs, and online gaming are used for less close friendships than phoning and texting (services that do not need internet). These findings do not match findings from our sample of early adolescents. We argue that, as new tools emerge, IM has almost completely replaced texting.

### ***Instant Messaging***

IM is the most used and most important communication tool for early adolescents in our sample, especially for classic communication purposes, and is also deemed the most vital tool to maintain relationships. As in older adolescents (Reich et al., 2012), in our sample of early adolescents IM is mostly used for connecting with offline friends and discussing a variety of topics with them, closely resembling real-life communication. Generally, intimate topics are shared in this domain rather than on SNSs or during gaming. This makes sense, as IM does usually not surpass a group of friends and intimate topics are more likely to be discussed with someone close than publicly (Hornstein & Truesdell, 1988). Large IM groups with many people (especially whole class groups) do not seem to strengthen connectedness, but rather lead to irritations. This might be explained by the fact that online communication allows an audience to be addressed without a specific recipient (Berger, 2013), leaving uninterested recipients with an overflow of information.

### *Social Networking Sites*

Facing the considerable amount of research about Facebook (e.g. Marino et al., 2018a, 2018b; Song et al., 2014), it seems important to mention that Facebook is hardly used by the early adolescents in this sample, supporting the presence of a declining trend in Facebook usage among teenagers (Anderson & Jiang, 2018). SNSs are used primarily for private communication and entertainment in our sample. This is in contrast to studies that found that 10-12 year-old American pupils use platforms like YouTube to seek a broad audience beyond their friends (Uhls & Greenfield, 2012) or that self-presentation is more important than actual interaction with other people online (Mazur & Kozarian, 2009). In our sample, YouTube is mostly only used to watch videos, often together with friends, and not to upload videos or comment on other videos. Thus, it is not really used as a tool for communication, but rather as a tool for entertainment. In accordance with this finding, adolescents in our sample seemed to attach little importance to

public approval, e.g. in the form of likes. This may be due to their young age but arguably also due to the cultural context and the inclusion of a large proportion of participants from more rural areas where personal attachment might still be perceived as more important – and available – than anonymous public “befriending”. It is a question for future research which determinants lead adolescents to pursue public self-presentation and how that interrelates with offline social connections.

### ***Online Gaming***

A dominance of male players and adult age has been linked to online gaming (Griffiths et al., 2003; Williams et al., 2008). Similarly, our questionnaire shows differences between boys and girls that are most likely related to the higher number of male online players (e.g. amount of contact with strangers). Yet, our sample shows extensive gaming behaviour already in early adolescence. This seems to be influenced substantially by the release of the game Fortnite, which led to growth in the games and interactive media industry by 13% in 2018 (Market Brief, 2018). It appears that now, instead of being a niche for “nerdy” people, online gaming has become a popular mainstream activity for (especially male) adolescents. These players strongly identify with the activity, and online and offline grouping among gamers is very common in our sample, supporting homophily during online as well as offline interactions. This is also supported by research about older adolescents, where gaming was found to be a motivator for friendship formation (Eklund & Roman, 2017). Ultimately, rather than just a tool for communication, online games are better described as a place to engage in a hobby with other players and friends, eliciting the same joy and feelings of well-being as other hobbies might. Gaming then also overlaps with other types of OCTs such as WhatsApp groups for the sole purpose of talking about Fortnite or the use of SNSs to watch (and sometimes post) videos about Fortnite. We argue that the fact that friends mostly talk about game-related information and organizational topics

during gameplay does not necessarily have to be seen as a disadvantage. Like many other hobbies such as playing board games or playing a team sport together, it seems plausible that friendships are not solely strengthened through communication about intimate topics but rather by being together and spending time together doing the same activity. The fact that intimate topics are still discussed in this setting despite the relative urgency of organizational topics for gameplay and the limited time given the gaming context supports this idea. It also shows the importance of including gaming in research about OCTs as these online spaces are used as a place to discuss topics that would otherwise be discussed via IMs, for example school or planning other activities, thus rendering the other OCTs unneeded. At the same time, communication via games might create or aggravate a gender divide within larger groups such as school classes.

### **Offline versus Online Friendships**

Online friendship formation is closely intertwined with offline friendships and shows similar patterns such as friendships clustering around similar activity preferences or same gender according to the concept of homophily. Yet, physical proximity is not required anymore due to the possibility of asynchronous communication, generating a new constant availability of connectedness. How this compares to the shaping of adolescents' friendships in offline settings is yet to be examined. Most of the participants in this study perceive asynchronicity as positive, even though in some cases it can also lead to high expectations concerning availability of the chat partner. The fact that early adolescents mostly see this advantage for IM might be because IM allows to overcome both temporal and spatial separation, whereas multiplayer games still demand temporal synchronicity.

While for most parts of their friendships OCTs (especially IM) are seen as a normal tool that early adolescents use without deliberation, there seems to be a threshold that OCTs still cannot fully breach and that early adolescents deem worthy of discussion, namely higher levels of

intimacy. This is highlighted by the fact that opinions about discussing intimate topics via OCTs are controversial while all other topics are acceptable to discuss via OCTs. Intimacy level rises with friendship level and self-disclosure (Altman & Taylor, 1973) but also depends on the responsiveness of the partner (Reis & Shaver, 1988). The asynchronicity of OCTs can lead to missing visual cues such as gestures or facial expressions (Nesi et al., 2018), which might limit the perceived responsiveness of the partner, and thus hinders intimacy. Since our results highlight discrepancy between different adolescents' perspectives on whether OCTs are appropriate for intimate discussions, an important area for future research is how these adolescents' different experiences might impact on their willingness to engage in intimate discussions via OCTs, such that these tools could be better brought to support friendship development. Notably however, in our sample early adolescents, who do not share intimate conversation via OCTs, do not necessarily experience less intimacy in their friendships but gain this intimacy by merging offline and online interactions.

Early adolescents in our sample were aware of safety and data protection when communicating online, especially with strangers. This might reflect an increased educational focus on online safety in Austria (BMBWF, 2018), but also stresses the fact that for today's adolescents there is no significant difference between online and offline communication: They have certainly been warned against talking with strangers in the offline world and hence also perceive the greatest threat to safety when talking with strangers online, irrespective of whether this actually constitutes a danger or not. At the same time, the online environment seems to provide a sense of safety, since they talk with strangers anyway. Also, they report rather unrealistic strategies of how they can protect themselves, which in turn shows high self-efficacy expectations in relation to navigating online communication.

### **Implications for Research**



Considering that arguments and aggressiveness happen online and affect early adolescents' emotional wellbeing, research should not only focus on problems arising from interaction with strangers, but also on problems arising amongst offline friends whilst communicating online and how to meet those challenges. Specific problems of online interactions that seem to deserve further scientific investigation are "hates" below posted photos and general "toxicity" or aggressiveness during gameplay and their psychological influence during the sensitive period of early adolescence.

Our results must be seen in the Austrian cultural context, where most children grow up with mobile phones. In our sample, almost all early adolescents start using OCTs on a regular basis around school transition at the age of 10. This is possible due to Austria's generally high socioecological status (SES), but even in our sample we could find indications that early adolescents without a phone or access to OCTs run the risk of lower peer acceptance and peer connectedness, making especially low SES pupils vulnerable to exclusion. The results are most likely generalizable to countries with similar developmental status even though preference for specific applications might differ.

Research should be aware of the benefits that come with reaching out to children in an environment that they deem positive. We need to put further effort into developing safe online spaces that educate and protect children from online-specific risks and help with friendship formation. Prevention or intervention programs that make use of online settings are increasingly being developed (e.g. Merry et al., 2012), but are not yet widely used in school settings, let alone specifically targeting the challenging time of school transition. This appears to be a promising time for support interventions, especially in systems with no structured transition support and in rural areas in which online interventions can help to overcome mobility issues as is the case in the Austrian context and school system.

Following our results, we believe that using digital devices such as mobile phones or serious games might benefit the acceptance of such interventions, especially when targeting communication or social interactions in general. In light of recent world-wide lockdowns due to Covid-19, advantages of digital media are further emphasized. Not only are OCTs a vital resource to stay connected to friends, but online interventions can also be deployed in times when personal contact is not possible and schools need to be closed. This can help classes to stay connected and pupils to engage in topics that also involve their socioemotional health during such challenging times.

### **Limitations**

Combining quantitative and qualitative research methodologies has been advocated to enhance research design by validating the results and promoting pragmatism (Onwuegbuzie & Leech, 2005). Yet, limitations of the qualitative analysis need to be considered. The focus groups were conducted in a semi-structured way and adapted over time. This is a usual and recommended process in qualitative research (Willig & Rogers, 2017) and allowed the collection of data reflecting the first-hand world views of early adolescents with minimum influence of adult views and expectations. Yet, quantified results generated from the qualitative assessments must be interpreted with caution, as the questions of the facilitators might have put different focus on topics and early adolescents might have spontaneously talked about topics that were on their minds at that very point in time due to reasons other than the actual importance of the topic. It is possible that some children did not disclose everything or deliberately kept information to themselves due to the presence of classmates and possible peer pressure. This was minimized by letting the participants choose their own focus groups, which mostly led to gathering of friends in the same groups. Yet, this procedure cannot fully diminish effects of social desirability, biased information, or withholding of information due to embarrassing content. The questionnaire used

in this study was author-developed and non-validated, but consistency between qualitative and quantitative data provides some initial evidence of concurrent validity. Finally, as friendship is a highly complex and multifaceted interpersonal phenomenon, the study is limited in its scope of addressing friendships and other outcomes. Yet, it provides a valuable step towards understanding online communication and friendships, their determinants, and their implications.

### **Conclusion**

As technology advances, it is crucial to give credit to the entanglement of real-life and online connectedness. Instead of a simple method of communication, OCTs, SNSs, and online gaming platforms provide complex spaces for interaction depending on their different features. This allows early adolescents to quickly reach each other and share activities and hobbies. Even in the context of acknowledged disadvantages, OCTs for the most part are deemed an important tool to establish and maintain friendships, with online and offline settings being closely intertwined. In this way, it is possible for technology to deepen and maintain friendships.

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## Tables

**Table 1***Demographics of the pupils who filled out the questionnaire*

		<i>Mean</i>	<i>SD</i>
Age	years	10.48	.928
		<i>n</i>	<i>%</i>
Gender	Female	433	46.2
Age in years	9	83	8.8
	10	450	48.0
	11	287	30.6
	12	66	7.0
	13	22	2.3
	14	5	0.5
	15	2	0.2
	16	1	0.1
School type	Primary school	187	19.9
	New secondary school	555	59.2
	Gymnasium	165	17.6
	Special needs school	31	3.3

**Table 2***Topics and example questions of the focus groups*

<b>Prevalent topics</b>	<b>Example questions</b>
General use of OCTs	How/for what are you using [e.g. WhatsApp]?
Topics during the use of OCTs	What do you talk about while playing [e.g. Fortnite]?
Pros and cons of OCTs	What is great?/What is not great? Have you ever experienced anything unpleasant?
OCTs in relation to friends and strangers	Does [e.g. WhatsApp] have an effect on your friendship? Have you ever met a person on [e.g. Fortnite] who became a friend in real life? Please tell me more about that.

**Table 3**

*Self-developed questionnaire on OCT use*

Question	Reply options
1. Which electronic devices do you use „very often“	Computer, Laptop, Console, Tablet, Mobile Phone - Multiple answers possible
2. Which electronic devices do you take to school with you?	Computer, Laptop, Console, Tablet, Mobile Phone - Multiple answers possible
3./4. How much time do you spend with electronic devices at home/while being with friends?	not at all, only rarely, much time, very much time
5./6. How much time do you spend with electronic devices during the week/during weekends?	hardly ever (< 1 hour), a little (1-2 hours), quite a lot (3-4 hours), very much (> 5 hours)
7. What do you use for communication with friends or classmates?	SMS, WhatsApp, SnapChat, Instagram, Facebook, nothing, something else - Multiple answers possible
8. How often do you use Internet/the mobile phone to talk to your best friends?	Never, sometimes, often, very often
9. What do you use the most?	Email, WhatsApp, TikTok, SnapChat, Instagram, Facebook, Twitter, YouTube, Twitch, Minecraft, Fortnite, PokémonGo - Ranking
10. Do you communicate with people who you have not met in real life?	Yes, no
11. Which games do you like most?	Open question - Ranking
12. Age and sex	

**Table 4***Early adolescents' favourite applications*

	Overall		Boys		Girls		<i>p</i> -value	Primary school		Secondary school		<i>p</i> -value
	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%		<i>n</i>	%	<i>n</i>	%	
WhatsApp	315	36	125	27	190	22	<.001	45	64	454	89	<.001
TikTok	95	11	23	5	72	18	<.001	23	13	73	10	n.s.
Instagram	74	8	39	8	35	9	n.s.	10	14	104	20	n.s.
SnapChat	66	8	30	6	36	9	<.001	10	14	122	24	n.s.
Twitch	20	2	18	4	2	<1	<.001	3	2	17	2	n.s.
Facebook	20	2	10	2	10	2	n.s.	8	11	25	5	n.s.
Email	20	2	11	2	9	2	n.s.	2	1	18	3	n.s.
Twitter	9	1	7	2	2	<1	n.s.	2	<1	7	<1	n.s.

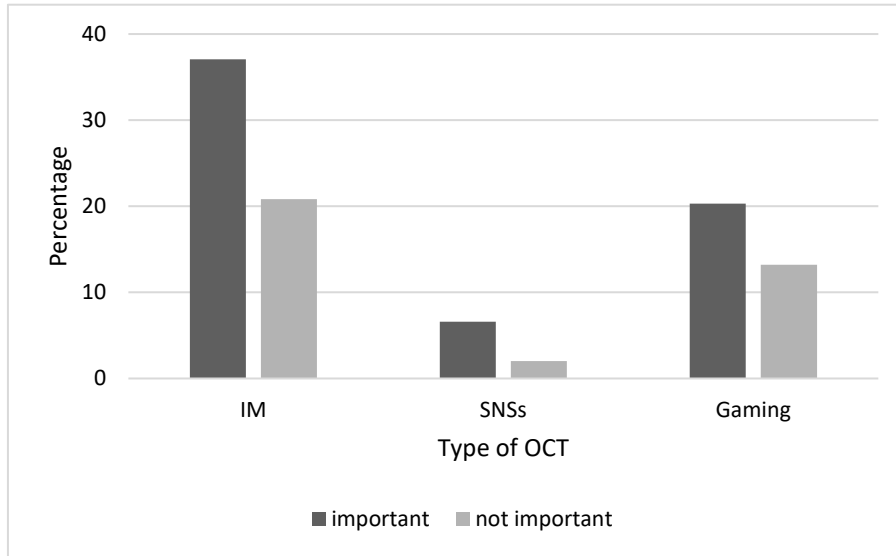
**Table 5***Coding structure of themes and subthemes including definitions, and examples*

<b>Theme</b>	<b>Subtheme</b>	<b>Definition</b>	<b>Example</b>
Value of a phone	Reasons for importance	Opinions on the value of a phone for friendships.	<i>“I think it makes friendships better, for example when you write something like: ‘Oh, you’re cute!’”</i>
	Reasons against importance		
Emotions	Type of emotions	Both positive and negative emotions and regulatory processes related to OCT use.	<i>“When you’re sad, you can make a video.”</i>
	Regulation processes		
Asynchronicity		Pros and cons of being able to communicate at any time without physical proximity.	<i>“When someone is far away, you can call them.”</i>
Level of intimacy	Topics	Information about the content discussed during OCT use and the aim of the conversation; differences between offline and online conversations.	<i>“If you forget what the homework assignment is, you can ask friends.”</i>
	Offline versus online topics		
Offline and online fusion		Offline OCT use (with friends, with face-to-face contact).	<i>“I visit a friend and we play together.”</i>
Aggression and arguments		Negative interactions online.	<i>„A lot of people write you after a loss [in Fortnite] and say: ‘You’re not good!’. I block them.”</i>
Friendship level	Use with friends online	Online OCT use (with friends, without face-to-face contact).	<i>“We play together online.”</i>
	Groups	Online OCT use with more than one person.	<i>“We have a class-group, but there have been problems and some have left the group.”</i>
	Use with strangers	Quantity and quality of interactions with strangers both online and offline, and their pros and cons.	<i>“I liked his picture, wrote him, then we just met.”</i>

Figures

**Figure 1**

*Mentions of the value of different types of OCTs for friendships*



**Figure 2**

*Mentions of topics during the use of different types of OCTs*

