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## Exploring Early Adolescents' Problem-Focused Strategies for Coping With Stressful IT Use Experiences

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# EXPLORING EARLY ADOLESCENTS' PROBLEM-FOCUSED STRATEGIES FOR COPING WITH STRESSFUL IT USE EXPERIENCES

*Research Paper*

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## Abstract

*In today's technology-oriented world, individuals' ability to cope with information technology (IT) has become increasingly important. This is especially relevant for early adolescents, who are expected to use IT from an early age on as part of their everyday lives. Although early adolescents' IT use and its outcomes have been studied, their related coping strategies have received less attention. The current study focuses on early adolescents' problem-focused strategies used to cope with stressful IT use experiences. The underlying data consist of semistructured interviews with 31 early adolescents. The results show that the strategies used by early adolescents differ in terms of their pervasiveness and level of IT use. Additionally, we reveal details about the connections of the strategies within different contexts, such as school and leisure. Although this study provides important insights for understanding early adolescents' coping strategies, more research is needed to assess the effectiveness of these strategies.*

*Keywords: early adolescents, IT use, coping, stressful experiences*

## 1 Introduction

People use information technology (IT) in many domains of their lives. In addition to the work context, IT is used for different leisure purposes. Even though IT use can provide many benefits, it can also entail adverse effects to one's well-being. This includes the phenomenon of technostress, a form of stress associated with IT use (see, e.g., Tarafdar et al., 2015). Being born into the IT society, adolescents are especially affected by IT use. In this sense, IT has become a natural part of their everyday lives, including the different contexts in which they engage. This makes the ability to cope with stressful situations encountered upon navigating IT environments an essential skill for young IT users.

Although coping is a traditional and widely studied topic in the field of psychology and related research areas (see, e.g., Carver, 2011; Lazarus and Folkman, 1985; Pearlin and Schooler, 1978), coping with technostress has received less attention within the domain of IT use. Moreover, few studies have addressed IT-related coping from the adolescent perspective (Schmidt et al., 2021). Given this lack of research and the integral role of IT in the lives of early adolescents, there is a clear need for further studies on the topic. Because early adolescents are accustomed to using various types of IT within school and leisure contexts, it could be assumed that they have also developed strategies for dealing with the everyday stress experiences arising in different IT use situations. This includes the notion that early adolescents' IT-related coping processes are expected to be characteristic of their age group, as their developmental stage, IT use context and preferred ways of using IT might differ from those of

adults. Furthermore, it has been noticed that the IT use habits of early adolescents can be linked with various health and well-being outcomes (see, e.g., Vanucci and McCauley Ohannessian, 2019; Favotto, Michaelson and Davison, 2017). IT environments create an intriguing arena for studying coping because the IT artifacts set certain boundaries (or opportunities) to the performed actions. While there are various coping approaches, the current study focuses especially on problem-focused coping (i.e. addressing the problematic situation per se), because it (1) provides possibilities for finding concrete solutions to stressful IT use situations (e.g., see Beaudry, 2009; Love and Irani, 2007) and (2) enables a focus on the IT artifact. As such, our aim of focusing on problem-focused coping is to provide tangible insights that take into account the stress experience itself, as well as the role of IT in the process. Our study seeks to answer the following question: “*What kind of problem-focused coping strategies do early adolescents employ to address stressful experiences that relate to IT use?*”.

For the theoretical background, the current study employs literature on stress, coping and IT use, discussed together with the adolescent perspective, to form an understanding of the relevant dimensions characterizing the coping actions performed within the adolescents' age group. For the empirical qualitative study, the underlying data consists of 31 semistructured interviews with Finnish early adolescents, between the ages of 9 and 15. The present study provides information about the problem-focused coping strategies used by early adolescents to address IT-related stress. This expands the literature on problem-focused coping by specifically focusing on early adolescents' experiences and discussing them together with specific IT use perspectives (e.g., the level of IT use). In this way, the study can help researchers understand the characteristics of early adolescents' IT-oriented coping processes, as well as their position in early adolescents' everyday lives.

In the following section, stress and coping are discussed in light of the literature. This is accompanied by the adolescent perspective, including considerations of IT use. The third section discusses the data collection and analysis processes. The fourth section focuses on the results, presenting the early adolescents' problem-focused coping strategies categorized according to their pervasiveness and level of IT use and discussed with citations from the data. The fifth section is dedicated to the discussion of the results in relation to the literature, including considerations to practice. Finally, the limitations of the current study, suggestions for future research, and conclusions are presented.

## 2 Background

Psychological stress is a normative part of human life. It can be defined as an individual's negative appraisal of the person–environment relationship in relation to their resources and well-being (Lazarus and Folkman, 1984, p. 21). This definition allows for the contemplation of various contexts and situations that can be associated with stressful experiences. Additionally, it is important to note that not all stress occurs because of major life events. Instead, many stress experiences are more likely related to less dramatic, even mundane, occurrences in our daily lives (DeLongis et al., 1982). Because IT use has an established position in many modern societies, it constitutes an important domain for studying individuals' daily stress experiences.

Technostress can be defined as “stress that individuals experience due to their use of [IT]” (Trafdar et al., 2019, p. 7). Technostress experiences can vary in intensity, and have adverse effects on the health and well-being of IT users. The concept can be further explored through the dimensions of 1) IT characteristics (i.e., an individual's perceptions of specific IT and its features), 2) stressors (i.e., stimuli that create stress to the individual), and 3) strains (i.e., stressor-initiated outcomes and responses in the individual's life) (e.g., see Salo et al., 2019; Ayyagari et al., 2011). Thus, an important component of technostress experiences is an individual's negatively loaded appraisal of IT-related stimuli. Because technostress arises in the continuum of IT use, it is intertwined with this context and should be studied accordingly, here also allowing for the identification of characteristic stress experiences.

Coping refers to one's “constantly changing cognitive and behavioral efforts exerted to manage specific external and/or internal demands that are appraised as taxing or exceeding the resources of the person” (Lazarus and Folkman, 1984, p. 141). Previously, IS researchers have employed the concept of coping, for example, to understand and explain individuals' use of IT in general at work (Fadel and Brown, 2010), users' different reactions to IT-related events within both work and nonwork contexts (Beaudry

and Pinsonneault, 2005; Salo et al., 2020), ICT-related interruptions to tasks (Galluch et al., 2015), and users' management of stress deriving from the use of work-related IT (Pirkkalainen et al., 2019). In addition to empirical studies, the strategies for coping with the threats associated with IT, as well as the related outcomes to an individual's identity, have been discussed (Nach and Lejeune, 2010). Often, coping is associated with negative or stressful events/incidents that place demands on individuals (Folkman and Moskowitz, 2004). In the context of IT use, examples of such demanding events may include continuously receiving too many distracting notifications on one's smartphone or perceiving new software as overly challenging to learn and use.

Although coping reflects a multifaceted phenomenon, two key concepts of coping are cognitive appraisals and coping strategies. Appraisals refer to an individual's implicit or explicit evaluations of the situation and its different dimensions that shape one's emotional and behavioral reactions to the situation, whereas coping strategies refer to the ways an individual approaches and deals with such situations (Lazarus and Folkman, 1984; Folkman and Moskowitz, 2004). Regarding appraisals, individuals tend to assess the meaning and significance of the situation and their ability to control the situation at hand (Folkman and Moskowitz, 2004; Salo et al., 2020). Regarding coping strategies, a prominent way to categorize individuals' coping strategies reflects two categories: problem-focused and emotion-focused coping strategies. Problem-focused coping strategies refer to instrumental and concrete ways to address the cause of the situation, whereas emotion-focused coping strategies are directed at managing one's emotions regarding the situation (Lazarus and Folkman, 1984). Complementary approaches that have been discussed previously include, for example, social coping, reactive coping, and proactive coping (Folkman and Moskowitz, 2004; Pirkkalainen et al., 2019; Salo et al., 2022), which tend to overlap with the categorization of coping strategies into problem-focused and emotion-focused approaches. Furthermore, other related studies have examined the mitigation of technostress by individuals' various modifications to their IT use (Salo et al., 2022), as well as organizational support (Ragu-Nathan et al., 2008; Tarafdar et al., 2015).

There is a wide variety of studies discussing stress and coping in the adult population. However, these topics have also been inspected from the developmental perspective, including themes such as transitions and societal change (Lazarus and Folkman, 1984, p. 10). This leaves room for the inclusion of different age groups, allowing for the contemplation of stress as a normative part of human development. For example, early adolescence can be characterized by different transitions, including developmental tasks such as identity formation (see, e.g., Baumrind, 1991). The life-span perspective focuses on development as a lifelong process, making adolescence an important developmental stage that can be examined through different viewpoints such as the role of context, active agency of the individual, and social change (Frydenberg, 1997, p. 8).

Even though coping has been studied for decades within various disciplines, coping strategies related to users' technostress experiences have received less attention. Especially, there is very little literature on the topic from the adolescent perspective (see, e.g., Schmidt et al., 2021). Because technostress can be viewed as a threat to certain domains of IT users' health and well-being and early adolescents lead manifold lives that include IT use as an integral part of participating in different school and leisure activities, their IT-related coping strategies are an especially important topic to study. In fact, adolescents have long been an age group that seems to deploy IT at a rapid pace (e.g., see Adams et al., 2013), including the discontinuation of IT that is no longer preferred (Drehlich et al., 2020). The use habits of adolescents can also differ from other age groups (Pfeil et al., 2009), and they tend to identify more problem-focused than emotion-focused coping strategies in relation to their IT use (see Schmidt et al., 2021). On a related note, IT use as a process is fundamentally linked to the technological foundation because certain IT characteristics (e.g., constant reachability) can contribute to demands in an individual (e.g., see Galluch et al., 2015). Additionally, the nature of the technology-oriented actions is what differentiates coping with IT from coping emerging in other domains of life. Thus, IT characteristics are an important dimension to consider upon discussing early adolescents' problem-focused coping strategies related to IT use.

### 3 Data Collection and Analysis

The purpose of the current study is to identify early adolescents' problem-focused coping strategies associated with stressful IT use experiences. Semistructured interviews (SSIs) were chosen as the method because of their ability to produce rich data. In addition, qualitative interviews can be viewed as effective and extensively used data gathering techniques within the IS field (e.g., see Myers and Newman, 2007). SSIs, in particular, include advantages such as versatility and flexibility (Kallio et al., 2016). Although different approaches for measuring coping (e.g., retrospective and momentary accounts, narrative methods) are not without their limitations, they can all provide valuable information when applied in the appropriate situation (Folkman and Moskowitz, 2004). Because coping strategies are often personal and situational, a dialogical approach to data collection seemed to be appropriate here. The use of an interview scheme provided the structure of the interview, but the flexibility of the situation itself allowed for focusing on themes that were important to each interviewee, as well as the emergence of new topics.

The interview scheme applied in the study was built around important concepts identified in the previous technostress literature, including technostressors, strains and mitigation/coping strategies. The interview scheme included questions such as "Can you think of a situation, where a notification arriving on your phone has felt bothersome? What were you doing, and why did it make you feel that way?" and "Are there ever times when you feel pressured by your social media posts? For example, do you compare yourself to others?". The scheme was structured in a manner that enabled moving from simple themes (e.g., devices and applications used, ways of using IT) to more complicated ones (e.g., stressful experiences related to SNSs), allowing a gradual move to aspects that might require more time to think. Following this logic, questions related to coping were mainly placed to the latter section of the scheme. This can be an advantageous approach to SSIs because participants have the chance to become more familiar with the interviewer, making it easier to answer more sensitive questions (e.g., see Adams, 2015). Finally, while the interview scheme was built to enable the discussion of different types of IT use in various contexts (e.g. school, home, hobbies), we let the interviewees focus particularly on areas that were meaningful to them (e.g., games).

In the beginning, different schools were approached to find the participants for the study. This included the exploration of existing collaboration networks (e.g., rectors, teachers). The study followed the university's ethical guidelines, including ensuring permission from the parents for their children to participate. Additionally, the participants' own willingness to participate was asked for in the form of a permission slip. The incentive to participate was increased by stating that a small prize (a movie ticket or gift card) would be raffled among the participants. Additionally, every participant received a sweet treat at the end of the interview.

Altogether, 31 interviews were conducted with students from primary (n=20) and secondary (n=11) schools. The participants were from 9 to 15 years of age, and a little over half of the participants were male (n=19). Because the definitions of adolescence vary in research (e.g., see Sawyer et al., 2018), the term *early adolescents* was chosen to be used as the most fitting description characterizing the age of the study participants. Often, the interviews lasted from half an hour to an hour, the shorter length being typical especially for the younger primary school students. The first set of interviews took place in the spring of 2018, and this was followed by the second set of interviews in the fall of 2020. Because the second set of interviews took place during the COVID-19 pandemic, permission to conduct the on-site interviews was applied for and received from the university. The pandemic situation was also closely discussed and monitored together with staff from the affiliated schools. Finally, specific safety measures (e.g., the use of face masks and thorough hand hygiene) were applied to minimize the potential risks associated with the interview situation.

After the interviews, the recordings were transcribed and moved into qualitative data analysis software (NVivo) to allow further coding and analysis. Each interview transcription was individually coded by identifying pieces of information that would relate to adolescents' IT use, stress or combinations of these themes. Hierarchies were used to establish relations between codes and place similar codes into the same categories. In this sense, coding was viewed as a part of the analysis process, with an important role of increasing understanding of the studied phenomenon (Weston et al., 2001). Although the interview scheme was inspired by the previous research, an effort was made to ensure that the coding process was not too fixated on these conceptualizations. For example, the codes included layers from specific aspects brought up by the participants (e.g., *plays less on school nights*) to broader categories more closely representing the concepts identified in the literature (e.g., *restricting use*). However, it is advantageous for SSIs to use information from prior literature to aid scheme building (e.g., see Rabionet, 2011).

Once the data were fully coded, the data were approached from the perspective of problem-focused coping in IT environments. First, all the codes and subcodes were scanned to identify mentions related to coping in stressful IT use situations, which resulted in 211 codes. Second, the interview citations associated with the codes were more carefully analyzed, including specifying the degree of stress (stressful/potentially stressful). An experience was categorized as stressful when it indicated moderate to high amounts of stress (e.g., through wordings such as *disturbs, too much*). Similarly, a mention was categorized as potentially stressful when there were less direct or implicit indications of stress (e.g., through wordings such as *might/could disturb*). This step resulted in a total of 122 mentions meeting the inclusion criteria (*potentially stressful/stressful experience* and *problem-focused, IT-oriented strategy*).

## 4 Results

All the early adolescent interviewees received notifications on their mobile phones. Additionally, as many as 18 of the 31 participants had modified their notification settings for one reason or another. In a related note, many of the participants' narrations about controlling their devices and applications were not associated with stressful experiences. However, as many as 30 participants interviewed had taken action to cope with experiences that could be characterized as stressful or potentially stressful. It was typical for a stressful experience that the stimuli from the IT artifact was described somehow as taxing (e.g., *a call disturbs, advertisements annoy, too many notifications*). Coping actions, in turn, often related to specific IT artifacts or situations (e.g., muting the notifications, flipping over the phone when going to sleep).

A total of 122 mentions related to problem-focused coping with stressful (99) or potentially stressful (23) experiences could be identified in the data. The coping strategies used by the participants could be divided into four categories (Table 1). First, eight mentions related to completely eliminating the stimuli from the IT artifact. Second, most (78) of the mentions could be characterized as situational elimination activities that aimed at eliminating stimuli from the IT artifact in certain situations. Third, a quarter of the mentions (31) related to more moderate modification activities that attempted to modify specific aspects of the IT use experience. Finally, a few of the mentions (5) discussed other activities performed within a game or app that could not be unambiguously placed in the other categories. While coping actions related to the elimination of stimuli, such as avoidance and distancing, can be viewed as emotion-focused strategies in the context of coping literature (see, e.g., Lazarus and Folkman, 1984, p.150), the strategies identified in this study are viewed primarily as problem-focused due to the concrete and instrumental nature of these actions when considered in the IT use context.

Coping Action	Level of IT Use	Number of Mentions
<b>Complete elimination</b>		<b>8</b>
Discontinuing use	External behavior change	5
Deleting a game/app	IT artifact change	3
<b>Situational elimination</b>		<b>78</b>
Muting the device	IT artifact settings	33
Muting or turning off notifications, turning the internet connection off	IT artifact settings	13
Flipping over or covering the device	Physical distance to IT artifact	12
Placing the device further away or leaving it at home	Physical distance to IT artifact	10
Turning the device off	IT artifact settings	6
Putting the device on airplane mode	IT artifact settings	2
Using the 'do not disturb' mode on the device	IT artifact settings	2
<b>Situational modification</b>		<b>31</b>
Restricting own use	External behavior change	22
Limiting the number of accounts being followed	Action within the IT artifact	2
Decreasing the number of notifications	IT artifact settings	2
Deleting messages	Action within the IT artifact	2
Adjusting the screen brightness	IT artifact settings	1
Switching between communication apps	IT artifact change	1
Turning the activity status off	IT artifact settings	1
<b>Others</b>		<b>5</b>
Succeeding in a game	Action within the IT artifact	3
Writing positive or encouraging comments	Action within the IT artifact	2
<b>Total</b>		<b>122</b>

Table 1. Coping strategies used by early adolescents, here categorized by the strategies' pervasiveness and the level of IT use

The strategies used by the participants could also be categorized according to the level of IT use in which they were carried out. *IT artifact* was used as an umbrella term to characterize different IT objects, namely devices, applications, games, and their bundles. The more granular levels of IT use can be observed in the phrasing of the individual coping actions. Even though it was common for the strategies to target the settings of an IT artifact, many of the mentions also related to external use behavior or adding physical distance away from the artifact. Additionally, some of the strategies consisted of specific actions performed within an IT artifact or IT artifact change. The identified strategies and their differentiating characteristics are discussed in more detail below.

#### 4.1 Complete elimination

Some of the strategies resulted in complete elimination of interactions with the related IT artifact. In most cases, the strategies related to discontinuing the use of an app, game, or device. The discontinuation related to situations where the IT artifact or its use included unpleasant elements that exceeded the person's willingness to use the artifact.

*Only with some games, when I used to play games—when you noticed that it started to annoy you or you would get hooked too much, then you'd just stop [using it]. (Secondary school student)*

*Well, I haven't really stopped using some app altogether because of notifications, but if you get a terrible number of ads, then yeah. (Secondary school student)*

Additionally, some of the participants referred to deleting a game or an app altogether. Much like with discontinuation, these strategies were also related to unpleasant situations. However, there were also references to viewing the IT artifact as not useful.

*I deleted [an instant messaging app] from my phone when I got too many of those notifications. So I, umm, don't like need it on my phone because I... When I go on the computer, then I will read [them] there. If there is something important, then I can answer there. (Primary school student)*

IS discontinuance has been explored by previous studies, especially in the context of SNS use (e.g., see Turel, 2016), including the technostress perspective (Maier et al., 2015). These actions can be seen as a definitive means to address perceived problems with specific IT artifacts. At the same time, it is possible that the artifact might not hold a significant position in the user's life, as illustrated by the above example. Thus, although we can evaluate the degree of the action from the point of view of the IT artifact use outcome, it might be more difficult to specify what potential advantages are lost in the process.

## 4.2 Situational elimination

Over half of the strategies used by the participants related to situational elimination. This category differs from complete elimination in the sense that although the actions performed aim to eliminate bothersome stimuli, they are performed only in certain situations or for a specific purpose. The strategies in this category could be divided into two subcategories according to the IT use level in which they are carried out.

The strategies in the first subcategory related to adjusting IT artifact settings; these included pervasive actions such as turning off the notifications or the device altogether or putting the device in airplane mode. Slightly milder elimination strategies were more specifically targeted at certain stimuli, such as muting the device or the notifications, using the *do not disturb* mode, or turning the internet connection off. Similar strategies to manage technostress are also used in the adult population (Salo et al., 2017).

*And, for example, on some exam days or on days that you do schoolwork you try to, like, turn off the phone altogether. (Secondary school student)*

*I have done this thing that I've turned off notifications for some groups and, for example, I've turned off the weather [notifications], or anything that disturbs you a lot or even a little bit. So, I've turned them off and to this day, they have not been of any harm. (Secondary school student)*

*[I have taken notifications off] from like, [mobile game 1] and [mobile game 2], so that they wouldn't send too many notifications—Often you would get, well, a lot of notifications from them, and you don't have time to look at all the notifications—they are a bit bothersome. (Primary school student)*

*For example, when I go to bed, I put the internet connection off so it does not matter if you keep the sounds on or not because you don't get them [the notifications] then. (Primary school student)*

In the second subcategory, the strategies related to adding physical distance to the IT artifact, which included actions such as placing the device further away or leaving it at home. In these instances, the physical distance to the device could become substantial. The remaining strategies related to more mechanical actions, such as flipping over or covering the device. Although the distance itself in the case of these strategies might not be a noteworthy one, they would eliminate seeing the screen activity itself.

*A lot of the time, I give my phone completely to someone else. In those kinds of situations, when you're doing some other activities, then I would just give the phone to another person and say, "Give that back to me in like half an hour." So that I wouldn't focus on it too much. (Secondary school student)*



*Usually, I keep my phone further [away], um, because often I do my homework in peace and quiet—so that the notifications wouldn't keep coming all the time—for example, the ones from groups. (Primary school student)*

*Well, for example, when I go to sleep, I put it there so that the screen is face down—and, well, when I'm doing the homework. (Primary school student)*

*Umm, I have sometimes [turned the device] when there has been a moment when everyone in a group is discussing about something a lot, and then I would like turn it away from the top, so that I wouldn't see the light [on the screen]. (Primary school student)*

Adolescents can view IT use as distracting for various activities, including leisure (Allaby and Shannon, 2019). The strategies in this category often related to situations when it was important to focus on another activity, such as schoolwork or going to sleep. There were also mentions of turning off notifications for IT artifacts not viewed as useful or important. These actions show that early adolescents can use diverse strategies to eliminate stimuli from IT artifacts in different situations, depending on their current needs.

### 4.3 Situational modification

The second most prevalent category of the strategies used was the situational modification of IT use. This category differs from situational elimination in the sense that the actions do not inherently aim to eliminate the stimuli completely but to instead moderate certain aspects of the experience. The strategies in this category targeted various levels of interaction with the IT artifact, from changing one's own behavior to performing specific actions within the artifact.

Most often, the strategies within this category related to restricting one's IT use. For example, the participants noted that it is important to acknowledge one's limits in using IT. Often, restriction was associated with the ability to focus on schoolwork, maintain sleep schedules, or keep the overall IT use during the COVID-19 situation at bay.

*You realize by yourself that you have to stop, for example, if you have played long enough. (Primary school student)*

*Yeah, so these days I try not to use the phone right before bed. At some point, I had quite a lot of all kinds of sleeping problems. Like, for example, going to bed really late. So I've noticed that when you go to bed early and you don't browse the phone, you fall asleep better. (Secondary school student)*

*[During the COVID-19 situation] maybe there was even a little less [computer use] than [usual]—When you've been on the computer all day—you like tried to decrease it. (Primary school student)*

There were also some mentions of restricting IT use in social contexts. This could be a collective decision made with friends or personal decision that could help them focus on the task at hand. It was also brought up that certain apps might be more suitable in certain situations than others.

*[Interviewer: If you are hanging out with your friends, is it common that at some point you take your phones out and start browsing them?] Well, yeah. Or I feel that it was more like that sometimes before. Maybe now you have somehow realized that it can be disturbing in that situation. I mean, this is the situation in my own friend circle—it has decreased quite a bit. I mean, the unnecessary browsing of social media. It sort of bores you already. (Secondary school student)*

*[With my friends] I use [a messaging app] and then, if we are on the computer, I usually keep my phone on mute because I don't like it when I do something and it starts to make noise, so I have [another messaging app] on my computer. (Primary school student)*

This kind of modification of routines can be seen as a strategy to decrease the stress related to IT use (Salo et al., 2017). In terms of adjusting IT artifact settings, the participants referred to actions such as decreasing the number of notifications, turning the activity status off for a certain application, or

adjusting the screen's brightness. Additionally, there were some mentions of the specific actions performed within the IT artifact itself, namely limiting the number of accounts being followed within an app and deleting received messages.

*Well, like maybe half a year ago, I got a lot of notifications from a game, so I set it so that it wouldn't be allowed to send a great amount of them. (Primary school student)*

*I have shut it [the activity status] off [for a messaging app], so it does not display when I have been active—for example, because of homework, so that everyone would not beg me [to tell, what was for] homework. And also like, you try to be unreachable. (Secondary school student)*

The modification strategies brought up by the participants seem to relate to different aspects of their everyday lives. In many instances, the aim was to help focus on relevant activities (e.g., doing homework, spending time with friends), maintain a healthy relationship with IT use, or simply decrease everyday stimuli from IT artifacts. Although these coping actions can be motivated by the current situation, they can also suggest a future-oriented focus, making them include elements from proactive coping (see, e.g., Aspinwall and Taylor, 1997). Thus, early adolescents can use different modification strategies to adjust the IT artifact and their interactions with it to suit diverse current and future situations.

#### 4.4 Others

Finally, a few of the strategies could not be unambiguously placed in the aforementioned categories. These were actions performed within the IT artifact, namely succeeding in a game and writing positive or encouraging comments.

*This one time, I accidentally deleted [a mobile game]—and I couldn't get this previous user back. That is when I got a bit frustrated, but then, I got [a game character], and I was not frustrated anymore. (Primary school student)*

*Well, sometimes when I've seen someone receive a lot of hate, then I've gone ahead and given [them] a nice comment. For example, if they have [a certain hobby], I compliment their [hobby-related achievement] or the video itself. (Secondary school student)*

Game playing is a popular pastime among people of different ages. In the Finnish population, it has been noted that adolescents tend to play digital entertainment games most frequently on a daily and weekly basis when compared with other age groups (Kinnunen et al., 2020). Engaging in online communities has also traditionally been popular among adolescents (Livingstone et al., 2011). Thus, these strategies seem to be specific to the leisure contexts that tend to be especially meaningful to this age group.

## 5 Discussion

Early adolescents can use problem-focused strategies to cope with stressful IT use experiences. We found that the strategies can be further categorized based on their pervasiveness and level at which they are carried out. Although the performed actions can aim for the complete elimination of stimuli from the IT artifact, the elimination activities were often more situational. Moreover, a part of the strategies aimed for mere situational modification of the stimuli. In addition to externally changing the use behavior or the IT artifact used, the strategies were commonly executed through IT artifact settings or by adding physical distance to the IT artifact. Finally, some strategies included the actions performed within a specific IT artifact.

### 5.1 Research contributions

This study contributes to research by identifying early adolescents' problem-focused coping strategies associated with IT use. While the focus on the pervasiveness of the strategies provides insights into the general nature of the stress-initiated responses, the characterizations of individual coping actions provide valuable information on specific use instances. The level of IT use, in turn, connects the strategies to their IT context, making the problem-focused approach a visible quality that is promoted

by the IT-oriented nature of the strategies. In terms of IT-related coping, this research provides insights by discussing the topic from the early adolescent perspective, in conjunction with essential aspects characteristic of different IT use situations.

The coping strategies identified in this study were often associated with different school and leisure-related situations. In addition, some of the experiences were connected to IT use on a more general level, crossing various contexts (e.g., habits). The most definitive coping actions performed by the participants aimed for complete elimination of stressful stimuli. Complete elimination of the IT artifact or its use can be a very effective approach for getting rid of the disturbance associated with it. Although removing apps or files that are no longer needed seems to be a common coping action among adolescents (Schmidt et al., 2021), these strategies were less frequent in our data. In a way, this kind of elimination of stimuli could even be viewed as including elements of avoidance (e.g., see Billings and Moos, 1981). Instead of confronting the actual problem, it might seem tempting to dispose of the arena in which it occurs. However, this strategy has the potential to dispose of the good (i.e., the positive side of IT use) along with the bad (Salo et al., 2022). Additionally, it has been noted that habits can be an important driver of continued use (Limayem et al., 2007), which could suggest that less habitual IT use is more prone to discontinuation. Because of this, it might be beneficial to inspect the significance and the position of the IT artifact as part of the individual's everyday life. At the same time, it is important to keep in mind that continuation and discontinuation processes might not be entirely comparable (Turel, 2015).

Elimination strategies can also be more situational, allowing for more flexibility in the process. It was common for these strategies to target the sounds of the device, either by muting the notifications or the device altogether. However, using different modes (e.g., airplane mode, do not disturb) and turning the device off could provide even more pervasive options. Situational elimination strategies can be helpful for reducing IT-related stress and can benefit from the personal valuation of different kinds of stimuli coming from the IT artifact (Salo et al., 2017). Many times, adding physical barriers to accessing or viewing the artifact (e.g., long distance, flipping over or covering the device) was also seen as appropriate for the situation. Similar coping strategies used by adolescents, such as muting chat groups, using silent or airplane mode and leaving the phone at home, have been identified in earlier technostress research as well (Schmidt et al., 2021). For the elimination strategies identified in this study, situational factors (e.g., doing homework, going to sleep) seemed to be especially relevant for choosing the appropriate action. Thus, early adolescents seem to have formed specific, IT-oriented practices for dealing with artifact-related stimuli in different contexts.

The situational modification strategies, in turn, included more nuances in terms of the specific actions performed and their level of IT use. The strategies were sometimes related to communication and social media applications where the participants referred to adjusting their settings or performing specific actions to reduce stimuli (e.g., limit followed accounts, delete messages). Social networking services, in particular, have been associated with stress experiences in prior literature (e.g., see Salo et al., 2019; Lim and Choi, 2017; Maier et al., 2012). However, because the situational modification strategies were often related to restricting their own use, the concepts of control, self-regulation and self-efficacy seem to be a characteristic of this category. Although control, self-regulation and self-efficacy can be viewed as a set of beliefs affecting the appraisal, they can also be viewed as a part of the coping process (e.g., see Lazarus and Folkman, 1984, p.170-171). Behavioral changes can include determined actions such as modifying IT use in different situations (Salo et al., 2017). In the data, restricting one's own IT use was seen to reflect a skill reducing the need for parental control but also including positive effects for one's overall well-being (e.g., sleep quality) or preventing future problems.

Finally, the data included a few mentions related to other coping strategies, namely succeeding in a game and writing positive or encouraging comments. Experiences of success are often important for goal-oriented IT activities that are engaged in as part of leisure time. For example, challenge and sense of achievement have been specifically connected with goal-oriented game play (e.g., see Olsen, 2010; Yee, 2006), suggesting that these coping strategies might be more connected with the perceived meaningfulness of the related activity (i.e., game playing). Writing positive or encouraging comments, in turn, can be viewed as a way to increase positivity in online communities, which can sometimes establish a negatively loaded atmosphere (e.g., see Mihailova, 2020; Allison, 2020). Thus, the strategies

in this category seem to be closely intertwined with the participants' aim to make their leisure-related use experience specific to a certain, preferred IT environment more pleasurable.

The early adolescents' problem-focused coping strategies associated with stressful IT use experiences seem to be connected with both individual and situational factors, which is supported by earlier research (Schmidt et al., 2021). However, the pervasiveness of the coping strategies as well as the level of IT use associated with each action are essential aspects to consider in order to establish a more profound understanding of the underlying coping processes. Early adolescents are active IT users and as such, they have the potential to encounter stressful IT use situations as a part of their everyday lives. Although the early adolescents' coping-related stress experiences often seemed to remain on a moderate level, a similar finding in earlier research suggests that adolescents' technostress experiences tend to be lower in intensity when compared to the adult population (Schmidt et al., 2021). Even though younger generations have often been viewed as skillful IT users, possibly diminishing some technical frustration with different devices, it is important to note that growing up in a digital world is not a guarantee of superior information processing skills (see, e.g., Kirschner and De Bruyckere, 2017). However, IT and related use habits do evolve over time, shaping the experiences of young people. Finally, even though early adolescents are increasingly using IT for learning purposes, there can be variation among different schools and classrooms on how established the position of IT use is as part of everyday school activities. Thus, the amount and nature of school-related IT use should be considered when evaluating the significance of the stress experiences rising from mandatory IT use. Additionally, comparisons to the adults' stress experiences arising from IT use in the work context should be done with care.

While most stress experiences in human life might not be dramatic, everyday encounters with stress can play a major role in terms of adaptation and health (DeLongis et al., 1982). This is an important aspect to consider, especially because early adolescents' capabilities to address stress are still developing. Because of this, the health and well-being outcomes of IT-related stress, however minor, might be difficult to predict. Thus, early adolescents' interactions with IT should be carefully studied to ensure that their IT use habits do not contradict their future health. Additionally, the stress-coping process is dynamic and changing, different factors, such as identity, health and social relationships can both precede and be shaped by the chosen coping actions. For example, a person might view oneself as a certain kind of IT user, guiding their responses to IT stimuli. Reciprocally, the formed IT use habit might steer future interactions with IT. In this sense, the meaning-making and appraisal processes carried out by a person are also essential aspects to consider in this context. Finally, it is important to note that early adolescents are at the beginning of their journey as IT users. Their skills to cope with IT-related stress are expected to develop over time, making their current strategies and habits a baseline for future development.

## **5.2 Practical contributions**

The current study has practical implications for various stakeholders. Because the results comprise actual strategies used by early adolescents in school and leisure contexts, this information can be used by different practitioners to gain a better understanding of early adolescents' IT use and related well-being processes. This includes, for example, student teachers, primary and secondary school teachers, and health professionals working with this age group. Knowledge regarding coping strategies can be helpful for planning IT use practices in schools, and for understanding students' interactions with different IT artifacts. In terms of design, perspectives on young IT users' habits can also be used by designers and developers of IT artifacts because this information can help tailor their products to meet the needs of different age groups. In this sense, the results can prove to be especially fruitful for the designers of educational software companies. Finally, the results can be used by parents and early adolescents to build better practices for everyday IT use situations.

### **5.3 Limitations and future research**

The current study has certain limitations. First, although the results can be useful for various research and practical endeavors, it should be noted that this study was carried out in a population of Finnish early adolescents between the ages of 9 and 15. Thus, careful consideration must be taken when the information is applied in other countries, cultures or age groups. Second, the current study focused specifically on problem-focused coping strategies. However, adolescents also use emotion-focused coping strategies (e.g., see Schmidt et al., 2021) that comprise an important research topic. Third, IT use situations can also be framed through the conceptualizations of threats and opportunities (see, e.g., Beaudry and Pinsonneault, 2005). Fourth, while early adolescents can use various problem-focused coping strategies to address IT-related stress, it should be noted that the problem is often intertwined with the functionality of the IT artifact. This makes it sometimes difficult to evaluate what would be the appropriate level of action to take. Fifth, IT use can be conceptualized in many different ways. In the future, it would be interesting to see how different coping strategies can relate to specific app characteristics or even user personalities. Sixth, our data was based on perceptions rather than physiological stress measurements, which comprise another valuable source for collecting stress-related information. Seventh, although the study participants were often asked whether or not they felt that the strategies they have used have been effective in reducing disturbances from the devices, the adolescents' answers tended to remain quite brief. Future research is needed to evaluate the effectiveness of these strategies. Eighth, the present study focused on the early adolescents' personal views, making the parental perspective relevant only when it related to stressful experiences and/or specific coping strategies. The role of parental models and rules applied in families should be further reviewed in future research. Finally, although the early adolescents' strategies were explored as resolving IT-related stress situations, coping strategies can also include disadvantages (e.g., see Salo et al., 2022), making this an important topic to be covered by upcoming research.

## **6 Conclusions**

Early adolescents can use different problem-focused strategies to cope with adverse IT use experiences. The coping strategies can aim for the complete elimination of stimuli from the IT artifact in question but are more often associated with situational elimination or mere modification. In terms of specific actions, the strategies are commonly related to behavior change, adjusting IT artifact settings, or adding physical distance away from the artifact. The actions can also be performed within a certain IT artifact or on the level of IT artifact change. Although the early adolescents' strategies can be discussed together with concepts from technostress, coping, and IT use literature, the characteristics of the use contexts specific to this age group (e.g., school, leisure) should be considered in future research. Early adolescents are active IT users capable of performing diverse problem-solving actions in different situations. However, the important role of providing support, understanding, and education regarding IT use should not be overlooked.

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