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Digital stress among Chinese adolescents: a focus group study

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Abstract

Introduction. Current digital stress studies among teenagers overlooked a population with distinct societal and cultural characteristics: Chinese teenagers. This paper reports differences in Chinese adolescents' attitudes towards components of digital stress and presents two novel stressors.

Method. This study investigated 74 participants in three senior high schools (grade 10 - grade 12) in China via focus group interviews. Transcripts of the interviews were used for analysis.

Analysis. Qualitative analysis was used for this study. The software MAXQDA for Qualitative Data Analysis (Version 22.7.0, 2022) was used for the analysis steps.

Results. The analysis reveals differences in Chinese adolescents' attitudes towards components of digital stress in terms of online vigilance and communication overload. In addition, two novel stressors - the obligated use of learning features in social media and perceived social issues from media or news applications – were identified.

Conclusion. Digital stress among Chinese adolescents was significantly different compared to the extant digital stress framework. Such differences were both manifested in better tolerance of certain stressors (e.g. online vigilance or information overload) and in the emergence of novel stressors, such as obligation resentment and social concerns.

Introduction

In most modern societies, teenagers gain access to skills and knowledge to build up the basis for their future careers. They also start to separate from their original family (Chisholm and Hurrelmann, 1995). Furthermore, they have now been influenced heavily by the wide accessibility of various online services and are forming a new behavioural pattern which includes digital habits (Rutledge et al., 2019). In America, for example, only 15% of the population in their adolescence reported not using the Internet (Anderson et al., 2017). This generation of adolescents becomes the first generation to live in both worlds: on Earth and on the Internet. Thus, online services have imbued new possibilities in adolescents' daily activities: they can reach out to and be reached by their friends 24/7, start virtual adventures in video games, publish ideas to the general public, complete courses, and homework remotely, etc. Such constant connectivity creates heterogeneous results. According to previous studies, although online services may help adolescents achieve developmental goals (James et al., 2017), they also negatively impact interpersonal relationships and emotional well-being, creating digital stress or anxiety that obstructs personal development (Akin, 2012).

Digital stress of teenagers is a big focus of all digital stress studies (De Groote and Van Ouytsel, 2022), and the field is already fruitful. Previous researchers identified various factors in the digital stress perceived by teenagers (Weinstein and Selman, 2016; Beyens et al., 2016; Steele et al., 2020). Based on previous work, Hall (2021) validated four stress factors and introduced the fifth through exploratory factor analysis, thus formulating the five-factor model of digital stress and a 24-item scale, which was validated and used in several follow-up studies (De Groote and Van Ouytsel, 2022; Zhang et al., 2023).

Despite the effort to validate the resulting scale in various cultural contexts, few studies have examined the transferability of the model in different contexts – in this case, different populations with different ICT-related cultures and behaviours. This study chose Chinese teenagers as the target population for two reasons. Firstly, this is an important yet currently ignored population. There are currently over 105 million Chinese in their teens (12-19) (NBSC, 2020), and the way they use information and communication technology (ICT) in daily life is distinctive from their European or American peers. More importantly, previous literature has revealed unique challenges they face regarding ICT use. For example, Chinese high schools and parents are known to exert firm control over smart devices or even confiscate them during school hours. And part of their ICT use is obligated (Aiping et al., 2022). Understanding how this currently ignored population perceives digital stress and copes with those unique challenges from daily ICT uses would be a novel supplement to the five-factor framework and could also provide insight for online service providers, governments, and educators to address existing issues.

Our study aims to address this gap in the research field by acquiring and analysing the perceptions of Chinese adolescents. We conducted focus group interviews in three senior high schools (grade 10 - grade 12) in China and examined the results to answer the following research questions:

1. How do Chinese adolescents perceive the context, causes, and effects of digital stress?
2. Do the contextual differences lead to novel stress factors other than those in the five-factor framework?

Literature review

Digital stress

Research on the association between information technology and psychological health traces back to the 1980s when the phenomenon was called *modern disease* by American psychologist Brod (1984). He described it as the inability to adapt to and cope with new computer technology. Different from the *disease perspective*, the concept was subsequently expanded by two American psychologists, Weil and Rosen (1997, p. 36), to indicate '*any negative impact on attitudes, thoughts, behaviours or psychology caused*

directly or indirectly by technology'. A variety of terms were used to depict similar situations, like *computer phobia* and *computer anxiety*.

The concept of digital stress emerged as a result of the proliferation of ICT applications from the workplace to the private sphere. Given that online access was restricted to the government, military, and corporate domains in the early Internet age, the previous research on IT-induced stress mainly focused on work-related technology usage (Reinecke et al., 2017). However, information technology and mobile devices have reformed people's communication patterns. Individuals could exchange information online almost anywhere and anytime, achieving the state of "constant connectedness", which may take up an increasing share of time and cognitive resources (Hefner and Vorderer, 2016; Reinecke et al., 2017; De Groote and Van Ouytsel, 2022). Much research demonstrates that ICT use, mainly social media use, is associated with higher psychological symptoms (Thomée et al., 2007; Chen and Lee, 2013).

Hefner and Vorderer (2016, p. 237) were the first scholars who proposed the term *digital stress*. They defined it as '*stress resulting from a strong and perhaps almost permanent use of information and communication technology*', believing digital stress is triggered by permanent access to an inconceivable amount and diversity of (social) content. Reinecke et al. (2017) considered digital stress as the individual's stress reactions elicited by environmental demands originating from using ICT. Based on the literature review of the association between digital media use and psychosocial functioning, Steele et al. (2020) concluded that digital stress is a subjective experience that results from specific stimuli. Consistent with Lazarus and Folkman's transactional theory of stress (Lazarus et al., 1984), research that contributed to the construction of digital stress emphasised the significant role of cognitive appraisal. Namely, ICT users are more likely to suffer stress when they consider the online situational demand is beyond their coping resources (Steele et al., 2020), which provides a theoretical basis for exploring the underlying mechanism of digital stress. The shift from technostress to digital stress results from the development and spread of modern information technology. Digital stress encompasses a broader range of ICT usage scenarios and better aligns with the current public lifestyle. That is also why this paper adopts digital stress as the perspective for inspecting adolescents.

Digital stress among adolescents

As the generation grows with rapid technical advances, modern teenagers have significantly relied on ICTs such as social media (Pew Research Center, 2022). Adolescence is a distinct period of biological, psychological, and social development that confers vulnerability to mental health problems, making it a particularly relevant developmental stage to study (Blakemore, 2019; van der Schuur et al., 2019).

Arguing that the open and immediate network environment poses new challenges to teenagers' social relationships, Weinstein and Selman analysed the content of adolescents' accounts. They found six social and digital stressors (Weinstein and Selman, 2016). Similarly, various studies explored and classified stressors resulting from social networking sites (SNSs) use (Calancie et al., 2017; De Groote and Van Ouytsel, 2022; Winstone et al., 2023). Other researchers have worked to uncover the antecedents and consequences of digital stress in adolescents. Factors like fear of missing out (Beyens et al., 2016) and social media use frequency (Nick et al., 2022) were found to be perceived causes and impair young peoples' physical (e.g., sleep latency and daytime sleepiness; van der Schuur Baumgartner & Sumter, 2019) and psychological health (e.g., depress; Nick et al., 2022).

Pointing out that current literature on digital stress is complicated by multiple nomenclatures for similar or identical constructs, Steele et al. (2020) summarized the existing research related to adolescent digital stress, developed a framework that includes four factors: availability stress, approval anxiety, fear of missing out (FoMO), and communication overload. According to Steele, availability stress refers to distress (e.g., guilt and anxiety) stemming from internalizing

others' expectations that the individual should be available and respond quickly by digital means. Approval anxiety is the uncertainty and anxiety about others' responses and reactions to one's posts or elements of one's digital footprint. FoMo reflects the disease due to the real, perceived, or anticipated social consequences of others engaging in rewarding experiences from which one is absent. Connection overload describes the subjective experience of receiving excessive input from digital sources. The validity of the multidimensional conceptualization was empirically tested by Hall et al. (Hall et al., 2021). On the basis of four elements, the exploratory factor analysis (EFA) results revealed the fifth factor initially conceptualized as FoMO. The new item reflects the compulsive checking of social media accounts and a strong desire to access one's mobile device (Reinecke et al., 2018; Hall et al., 2021), called online vigilance. Based on the empirical result, Hall et al. developed a five-factor model of the digital stress.

Although adolescent digital stress has attracted the attention of the academic community, existing research mainly focuses on Western countries. Digital stress among adolescents in the East nation might present a very different picture (Xie et al., 2022). Unlike individualistic nations, people in collectivist countries like China tend to consider themselves a part of the group and shape their behaviour primarily based on in-group norms (Triandis, 2001). On the other hand, different education systems lead to distinct ICT usage patterns among students. Chinese teenagers aged 15-18 are generally under strict constraints from school and parents regarding mobile device use, showing different features of use frequency and scenario from those of Western teenagers. Considering the impact on ICT usage brought by cultural context, exploring digital stress among adolescents in an Eastern setting is especially relevant. Moreover, existing research involved several digital stressors that could not be classified into the five-factors-model, such as awareness of life events (Hampton et al., 2016) and privacy concerns (Cheikh-Ammar, 2020; Stevic et al., 2022), which means there might be unintegrated stressors of adolescent digital stress.

The present study examines the transferability of the five-dimensional conceptual model of digital stress in the Chinese context, exploring undetected stressors and stress responses and contributing to the study of digital stress from a cross-cultural standpoint.

Method

Sampling and procedures

The Chinese education system has three different school tracks for 10 to 12 graders: senior high schools, vocational high schools, and international high schools. Focus group interviews were chosen for data acquisition primarily to encourage discussion among participants through group dynamics and by creating a more comfortable environment: being around their friends rather than facing an interviewer alone. The ten focus group interviews discussed in this paper took place in May 2023, and the participants were recruited from three schools on different school tracks in China. Those schools are located in two prefectural-level cities in Hubei and Jiangxi Province. A total of 74 participants (42 boys, 56.8%; 32 girls, 43.2%) took part in the interview and were aged between 15-19. The characteristics of the focus groups are illustrated in Table. 1.

Group name	Number of participants	Number of males	Number of females	Age range	School track
Group 1	8	5	3	15-17	SHS
Group 2	9	9	0	16-18	SHS
Group 3	6	5	1	16-18	SHS
Group 4	6	2	4	15-18	SHS
Group 5	6	0	6	16-18	SHS
Group 6	7	3	4	16-19	SHS
Group 7	8	5	3	16-18	VHS
Group 8	8	6	2	16-19	VHS
Group 9	8	4	4	16-18	VHS
Group 10	8	3	5	16-19	IHS

Note: SHS means senior high school, which provides curriculums aiming at the Chinese National College Entrance Examination and, thereafter, college education in China; VHS means vocational high school; IHS means international high school, which provides non-Chinese-originated curriculums like AP, A-Level, etc., to facilitate its students to pursue education in European or American universities.

Table 1. Characteristics of Study Participants

This research works with the administration team of the three schools to recruit participants and acquire consent from the participants and their parents. In the week before the focus group interview, printed documents illustrating the purpose and procedures of the study were handed to the students along with a written consent form and a short questionnaire to acquire the participants' demographic statistics. Prior to the interview, the moderator (first author) and assistant moderator (second author) held a briefing with each focus group to ensure proper reading of printed materials about the purpose and procedures of the research as well as to answer questions from participants. The students were informed that they would receive no compensation, were voluntary to participate in the study, and could withdraw from the interview when they saw fit. The briefings and their subsequent interviews were held on campus after school to avoid possible time conflicts with their classes.

Data collection

In accordance with the suggestions by Kruger and Casey (2014), the focus groups lasted approximately 40 to 50 minutes, and all interviews started with an introduction of the key terms involved: digital stress and ICT use. The comprehensibility of the introduction part was pretested with online recruits of similar age. Then the moderator asked a list of semi-structured questions (Table. 2). Based on the reply, the moderator specified, rephrased, or asked more specific follow-up questions to encourage a more detailed or topic-specific elaboration from the participants. The assistant moderator co-moderated through the process while taking notes and recording the interview. At the end of the focus group interview, a summary of the findings will be read to the participants to ensure their agreement or to produce further discussion.

What kind of ICTs do you use in daily life?
Would an element of obligation make your experience of ICT use different? Why?
Why do you think some teenagers may face stress when using ICTs?
What is your worst personal experience of digital stress?
What improvements, according to your experience, would help to make you less stressed when using ICTs?
For how many hours do you access your mobile phone each week and how are they allocated during the period?

Note: Follow-up or scene-specific questions were not included.

Table 2. Interview questions (part)

Data analysis

All ten focus group interviews were audiotaped, anonymized, and transcribed by the moderator and assistant moderator with the help of shorthand notes taken at the scene. Edits were then made to the script in the following check for correctness. A senior researcher (third author) joined the second reading of the script, during which data saturation was verified. The transcription resulted in over 23542 lines of data. Considering the aim of the research, the qualitative content analysis method was chosen as it follows a systematic and rule-based approach using a category system focusing on the semantic content of the data (Mayring, 2010).

The software MAXQDA for Qualitative Data Analysis (Version 22.7.0, 2022) was used for the subsequent analysis steps. The first and second authors transcribed and analysed the data without involving the participants. The system's main categories were derived in a deductive way, referring to the summary of focus group interviews and the Five-Factor framework. As the underlying theory, the Five-Factor conceptual model of digital stress was consulted (Hall et al., 2021). Further sub-categories were established inductively (Mayring, 2010). All data were coded by the first author and double-checked by the whole research team. Disagreements in the coding and grouping process were discussed by the research team until a consensus was reached. Representative quotes from the focus groups, originally Chinese, were translated and presented to illustrate the findings.

Ethical considerations and data protection

All participants signed an informed consent form, which was additionally handed out in plain language a week before the interview. Parents of participants under 18 also signed a parental consent form. The research aims, and procedures were further explained before the start of each focus group. Written and oral information was provided to all participants on data protection, confidentiality, and anonymity of study results. All participants were literate and received assistance from research assistants to understand and sign the informed consent form. Recordings and transcripts were only circulated and read by the research team members, and data anonymity was secured.

Results

Components of digital stress within the five-factor framework

This section presents discussions of digital stress that fit the five-factor framework of Hall (2021): availability stress, approval anxiety, fear of missing out (FoMO), connection overload, and online vigilance. There were, in total, seven sub-categories of digital stressors identified inductively that were assigned to these five components. These overarching themes and the subthemes are presented in Table 2. The following part of this section will describe those sub-categories in detail.

Components of Digital Stress of the Five-Factor Framework	Perceived digital stressors	G1	G2	G3	G4	G5	G6	G7	G8	G9	G10	Total
Availability stress	**Delayed response**											
	• Anxiety caused by delayed response							√	√		√	3
	• Tolerance toward delayed response	√	√	√		√			√			5
Approval anxiety	**Perfection**											
	• Avoidance		√		√	√		√	√		√	6
	• Carefully editing the post	√		√		√		√		√		5
	• Seeing other perfect profiles				√		√			√		3
	Views, followers, and likes											
	• Insufficient views and followers	√	√	√	√	√		√	√	√	√	9
	• Too many views and followers		√	√	√	√	√	√	√		√	8
	• Likes	√	√	√	√	√	√	√	√	√	√	10
	Hostile comments											
	• Receiving hostile comments		√		√		√					3
	• Seeing hostile comments against others	√	√		√		√	√	√	√		7
Fear of missing out	**Insecurity from being absent**				√	√					√	3
Connection overload	**Too many advertisements**	√	√	√	√	√	√	√	√	√	√	10
Online vigilance	**Getting away from the smartphone**											
	• Feeling OK when the phone is not around	√	√	√	√		√					5
	• Difficulties getting away from the smartphone							√		√	√	3

Table 3. Overview of Perceived Digital Stressors in the Five-Factor Framework

Availability stress

Delayed Response. Delayed response was viewed as a digital stressor in ICT use by a part of our participants (mainly students from vocational high schools and international high schools). The stress came in both ways: they would feel worried when the person they were talking to did not respond in time, and they would also be distressed if they found themselves not responding to messages promptly.

> *My friend attends boarding school, so I normally send her messages when I think she is back home. If she doesn't respond in time, I will worry about her safety. You know, she goes to school and goes back home alone. I may also start to think that she just doesn't care as much anymore.* (Group 8, Participant #5, Female, Vocational High School)

It is also noteworthy that participants from five focus groups (four senior high school groups and one vocational school group) claimed not having such kind of stress because their phones were often not accessible, and this led to a tolerance of delayed responses.

> *I think it's OK to postpone the response for some time. I do that, too, because I may not have my phone with me now. I only felt anxious on infrequent occasions when they didn't respond for a long time, like a week.*
>
> (Group 5, Participant #1, Female, Senior High School)

Approval anxiety

Perfection. When appearing in cyberspace, our participants always worry about how others regard their profile. However, their strategy for dealing with such anxiety differs. The most popular strategy among our participants was avoidance. In six groups, the participants said they would avoid speaking or posting content if a large crowd could access their self-presentation. '*As long as the public could see my comments, I would feel stressed. I would fear if those things I said were correct or not. So, I normally withhold my views.*' (Group 10, Participant #4, Male, International High School).

Another strategy was to carefully select the content of the posts before sending them. Our participants would carefully tailor the sentences they try to post. Moreover, such behaviour would sometimes cause them to doubt if they are behaving like their usual self. '*When faced with a large crowd, I would choose to present a better self. That worries me to an extent. Actually, it's stressful to present myself like that.*' (Group 3, Participant #3, Male, Senior High School).

The perfect profile or others, especially peers, would trigger anxiety among the participants. Three participants claimed that seeing others' perfect lives would be an intense stressor. '*I saw those videos about foreign high schoolers who took their gap year travelling around Europe, and I reflected that I could only stay in school. It's hard to overcome that lasting sense of gap.*' (Group 9, Participant #6, Female, Vocational High School).

Views, Followers, and Likes. This was the most presented stressor in the themes of the five-factor model. The participants in all focus group interviews mentioned that they perceived getting views and followers and receiving few likes could make them stressed. Though they all expressed such concerns, Chinese adolescents in the conversations had varying opinions about the number of views and followers they would feel comfortable with. Part of the interviewees described their concerns about having too many or unexpected views or followers. In contrast, others believed not getting sufficient views or followers would worry them.

> *Yes. I mean, I do not want followers. You know, some people generally post things on the Internet so they can go back to check about them later. That is just what I do. There was a time when some unfamiliar classmates followed my Weibo (i.e., the leading social media website in China) account. I knew I would appear rude if I asked them not to do so, yet that stressed me out.*
>
> (Group 5, Participants #4, Female, Senior High School)

Getting more likes, contrarily, was uniformly viewed as a kind of pleasantness, even from strangers. According to one participant, such interaction rules out the possibility of a conflict of ideas. And they would only be stressed if there were not enough likes. '*When someone likes my posts, I feel a bit happy, even if those likes may be from total strangers. They cannot say anything unpleasant by clicking like, right?*' (Group 7, Participants #7, Female, Vocational High School).

Hostile Comments. Although fear of cyberbullying or cyber violence was mentioned in two group discussions, no interviewee actually suffered from such an act, and only three interviewees described comments they had received as toxic or hostile. None of them sought conflict because of such insults. Nevertheless, these kinds of hostile comments, when they emerged on rare occasions, nearly

always aroused a high level of stress among the participants.

> *When I was in junior high, I had an essay that won a prize at school and I published it on the Internet. At first, it was all praise. Then suddenly, there was a very blunt and vicious comment. Then I felt uncomfortable: I kept typing and deleting my comment for hours without sending it because I didn't know how to reply. I ended up just saying, 'Thank you for your comment".'*
>
> (Group 4, Participant #3, Female, Senior High School)

A more common scenario was when the comment was not directly against the participants. They would also be stressed when they saw a hostile comment against things or people they liked. Participants from seven focus groups reported such stress. The majority of the participants (five out of seven groups) would choose to avoid conflict by withholding their opinions or criticism. 'When browsing videos, you might see sour comments against the uploader. Then your mood would turn sour, too.' (Group 1, Participant #8, Female, Senior High School).

Fear of Missing Out

Insecurity from being absent. While our participants did not directly use the words FOMO, three groups did report that they wanted to check the updates of the lives of their friends constantly, and, should they lose track, a severe sense of insecurity would occur. '*Surely, you'd like to check and follow all the updates. They may be mad at you when you don't.*' (Group 5, Participant #4, Female, Senior High School).

Connection overload

Too many advertisements. In all ten focus groups, our participants mentioned that they received many notifications. Yet, the participants treated these notifications quite differently, even though the number of notifications could go above 100 notifications at a time. They generally do not worry about the notifications as long as they are not advertisements.

'*It's those annoying ads, both pop-up and video, that interrupt the viewing. It's a real turnoff.*'

(Group 1, Participant #4, Male, Senior High School)

Online vigilance

Getting Away from the Smartphone. The word *addiction* is frequently used among the interviewees to describe frequent smartphone use. While they all agree it was bad for their academic performance or health, they had varying altitudes when separated from their phones for a long time. Participants from senior high schools usually do not mind that as much because they were not allowed to use smart devices at school and had to leave them at home. '*It just doesn't really matter. Don't feel bad about not having your phone around. Mostly because I basically always don't have my phone with me.*' (Group 2, Participant #2, Male, Senior High School).

However, vocational and international schoolers, who were not under such restrictions, found it challenging to spend extended periods without their device. They also indicated that they were easily distracted by their smartphones. '*I'll probably use it whenever I have free time. If it's not around, I'll find a way to get it back.*' (Group 7, Participant #1, Male, Vocational High School).

Novel digital stressors

Two sub-categories of novel digital stressors, which were not included in the Five-Factor Framework, were identified during the analysis: obligation resentment and social concerns. This section discusses these aspects of digital stress. The summary of these subthemes is presented in Table 3. The following part of this section will describe those sub-categories in detail.

Perceived digital stressors	G1	G2	G3	G4	G5	G6	G7	G8	G9	G10	Total
Obligation resentment											
• Enforced use	√	√	√	√	√	√	√	√	√	√	10
• Increasing obligation					√	√					2
Social concerns											
• Negative news or opinions		√	√	√	√	√			√	√	7
• Difficulties judging news or opinions			√	√	√					√	4

Table 4. Overview of novel stressors

Obligation resentment

Participants from all focus groups mentioned a kind of resentment when they were forced to use applications like online learning platforms or chatgroups. The participants found it irritating to log onto them and accomplish assignments accordingly. All of the ten groups expressed a kind of mild annoyance. '*When you don't want to use it, but you're forced to, it's annoying.*' (Group 2, Participant #3, Male, Senior High School).

Two participants showed evident resentment or aversion towards the enforced use of ICT. They also mentioned that feelings may originate from the increasing frequency of use.

> *I think the pressure is because, with this program, I have to finish my teacher assignments and stuff, but I don't want to. I hate this app as its use has become more and more frequent.*
>
> *Moderator: You hate the app?*
>
> *Yes. I sometimes just stop responding to anyone who contacted me via QQ (i.e., a popular social media and IM application) because I don't want to open it.*
>
> (Group 5, Participant #1, Female, Senior High School)
>
> *I felt very irritated. I cursed in front of other students as the teacher assigned too much work on those platforms.*
>
> (Group 6, Participant #1 and #3, Male, Senior High School)

Social concerns

Social concerns were widely acknowledged as a source of stress among our interviewees. Seven groups expressed concerns about news or opinions they read on the Internet, though their worries were general and didn't hold criticism against a specific target. When those news or opinions are perceived as negative, they act as activating events and generate stress or anxiety.

> *The source of my stress is that sometimes when I'm in a bad mood, I'll go through the news, and the things I end up reading make me feel even worse. Like murder and robbery, that kind of news makes me feel terrible. When I walk around my community after reading such news, I feel stressed though I know I'm safe.*
>
> (Group 4, Participant #3, Female, Senior High School)

According to four groups of participants, their negative emotions could be worsened and turned into a strong sense of voidness and confusion when the participants could not decide whether the opinions that they saw were right or wrong or when they could not tell if the news was fake or not.

> *Some content creators may post those videos talking about what's going on in society and how they think about it. If I found that viewpoint to be over the top, I would feel uncomfortable. I didn't know if what he said was right or wrong. That made me feel like there might be something awful going around.*

(Group 5, Participant #5, Female, Senior High School)

Discussion

To our knowledge, this study is the first to engage in an empirical discussion on the transferability of the five-factor digital stress model in the context of Chinese adolescents. A total of nine sub-categories of digital stressors were identified from the interview. Although seven of the nine sub-categories fit neatly with the five-factor framework and all five components were identified, the perception of Chinese adolescents on certain components of digital stress exhibited significant differences when compared to earlier research, allowing us to highlight two insights.

First, a specific group (students from SHS) of our respondents appear to be less affected by online vigilance - the compulsion to constantly check social media accounts or access one's mobile device - compared to respondents from previous surveys which took place in a western school setting (De Groote and Van Ouytsel, 2022; Hall et al., 2021). Our respondents explained to us that the phone restrictions – not being allowed to have smartphones during school hours – that they were implied upon helped to mitigate online vigilance. Such a claim is further supported by the fact that their peers from VHS or IHS, who are not under any phone restriction, exhibited a greater level of compulsion to be constantly connected. Reinecke et al. (2018) proposed online vigilance as consisting of three aspects of user psychology: (1) cognitive orientation to permanent connectedness; (2) chronic attention to online-related cues; and (3) motivational disposition to prioritize options for online communication. Our observation is that phone restriction helps our respondents hold back these three aspects by generating time gaps between smartphone accesses to interrupt the cognitive orientation and chronic attention, and by creating a group culture of tolerance toward delayed online responses to diminish motivation for the prioritisation of online communication.

In addition, the surveyed Chinese adolescents are also less susceptible to connection overload as a whole. Unlike the respondents from the study of Weinstein (2016) or De Groote et al. (2022), most of our respondents would feel strong anxiety only when the ads were piling up. This may result from the use of different mobile applications. Although they have social media features, WeChat and QQ – the two most frequently mentioned use of ICTs – started in China as Messenger apps. That means most of our respondents only have *friends* but not *followers*, which reduces the number of messages and notifications they receive.

There were also two novel sub-categories of stressors: obligation resentment and social concerns. Past digital stress literature normally set up a non-work-related scenario. Therefore, the element of obligation was mostly absent. However, the combined effect of COVID-19 restrictions and the proliferation of ICT in school education created a unique scene in Chinese secondary schools where educators use a range of ICT tools to facilitate daily learning (Yang et al., 2022). According to our interviewees, a certain proportion of their online learning obligations were still kept in place when COVID-19 restrictions were lifted and became a source of their digital stress. What we would like to highlight here, and was rarely discussed in most previous studies is the shift from using specifically designed online learning tools (for doing remote learning) to using general-purpose social media applications (for assigning and submitting homework). Such a shift further obscures the line between school and private life, bringing the school or parental obligation to an online space that was traditionally for intimate connection (Weinstein, 2014). This finding also indicates that such obligated use, especially at a high frequency, may cause adolescents to temporarily disconnect from the app, and as a result, from their online friendships.

Social concerns were also perceived by our interviewees as a major source of digital stress. When they see negative news or public opinions on the Internet, they feel a sense of insecurity or anger, which is in line with previous studies showing that adolescents could experience anxiety over social issues like climate change (Crandon et al., 2022), and has constant

concerns over social issues like crime and violence, race regulations, and hunger and poverty (Oosterhoff et al., 2019). We also found that the digital stress originating from adolescents' social concerns worsened when they had trouble validating their source of information.

This study's theoretical contribution stems from two main sources. First, we use data from an academically underexplored yet highly relevant population to validate the transferability of the Five-Factor framework of digital stress. Following this route, our study initiates a new discussion of whether the behavioural and environmental context of different populations would cause cognitive differences regarding digital stressors already presented in the five-factor framework. Furthermore, we have presented two novel stressors to the original framework: obligation resentment and social concerns, which enables a differentiated analysis of adolescents' views on digital stress.

Limitations and future research

Like most empirical research, our findings are subject to interpretation and are limited to the data. However, these limitations also mean avenues for further research. First, three high schools in Hubei and Jiangxi were used to recruit volunteers for our study. As a result, it is not possible to generalize the study's findings to the total Chinese young population. To gain a more complete and nuanced knowledge of teenagers' experiences with digital stress, cross-national and cross-cultural study among varied groups is required. Second, some of the questions in the interview require our respondents to reveal private opinions and experiences in a group setting, and would therefore generate distortions. More fine-grained insights may be obtained if future research could examine digital stress among teenagers with different data acquisition methods. Third, while the obligated use of social media for learning was described by our respondents as annoying, our method did not set up a baseline where such learning tasks were carried out in an analogue manner for comparison. Future studies should incorporate this aspect into research design to more accurately measure the level of impact. Finally, although differences and novel stressors were identified, theorisation between the phenomenon and deep-lying assumptions was not in place. To this end, future research empirically testing those assumptions can be done to further enhance understanding in this field.

Conclusion

In this study, we examined Chinese adolescents' perceptions of digital stress. According to our findings, Chinese teenagers deal with digital stress quite differently. While they are less prone to online vigilance and connection overload, the obligated use of social media to learn as well as perceived social issues from media or news applications while using ICTs are technical aspects that reinforce the digital stress they perceive. The many factors that contribute to and are affected by digital pressures might be included in media literacy education. For instance, educators should discuss with their students about positive online relationships, responsible online behaviour, and the social expectations that lead to teens' peers expecting them to be online all the time.

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