

Capturing Teens' Voice in Designing Supportive Agents

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Adolescence is a period of intense transformation that requires social interactions and emotional support. When such support is not available, technology can offer a solution. We conducted a participatory design study with the aim of producing content recommendations for a supportive conversational agent (CA) for adolescents. Twenty teens between the ages of 12 to 18 were invited to converse about issues they were experiencing and offer conversational support to each other. Analysis of participants' conversations revealed that stress was the most frequent problem participants would seek support for. Participant responses to each other's problems offered both cognitive and emotional support, including advice on changing one's behavior, seeking help from others, prioritizing one's wellbeing, and statements of unconditional emotional support, among others. The findings indicate that many of the observed conversational solutions can be programmed in a supportive CA to appeal to a large group of adolescents.

* Place the footnote text for the author (if applicable) here.

CCS CONCEPTS • Human-center computing • Human-computer interaction (HCI) • HCI design and evaluation methods

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1 INTRODUCTION

Adolescence is a transitional period from childhood to adulthood characterized by intense physical, psychological, and social changes [Orben et al. 2020]. During this period, social interaction and support from peers is critical for adolescent development and wellbeing [De Goede et al. 2009]. Technology plays an increasingly important role in supporting social interactions and the mental health of adolescents (also referred to throughout as teens) [Cauberghe et al. 2021; Nesi et al. 2018]. Social distancing and isolation associated with COVID-19 necessitated an even deeper examination of the potential for technology to support teens wellbeing [Limone et al. 2021; Drouin et al. 2020; Yan 2020]. Studies related to the use of conversational agents (CA) as support tools [Fitzpatrick 2017; Baecker et al. 2020; Senaratne et al. 2019; Gardiner et al. 2017; Gabrielli et al. 2021; Meske et al. 2020] have shown promise in improving “cognitive change, self-esteem, and adaptive coping strategies” [Muppirishetty and Lee 2020] and providing general emotional support. We conducted a study to further the development of supportive CAs for teens by involving representatives of this adolescent population in participatory design of supportive conversations about their emotional difficulties. The aim of this study was to increase our understanding of these conversational elements that could be transferred from the human-to-human dialogue to the human-to-agent context.

2 RELEVANT WORK

Adolescents often experience heightened emotional difficulties, depression, loneliness and anxieties due to the significant physical, psychological, and social changes in their lives [Friedman and Kutash 1992; Orben et al. 2020]. Significant stressors in the lives of adolescents include major life changes (e.g., moving) and events that can cause chronic forms of stress (e.g., being a victim of bullying), as well as the day-to-day stressors of academic and social pressures, self-esteem and body image issues, conflict with family and friends, changes to the body, and grade transitions [Stress Management and Teens 2019; Lohman and Jarvis 2000; Compas et al. 1985]. In addition to the many stressors that adolescents face, they are also navigating a global pandemic during a time of critical development in their lives. Recent studies indicate that the stress and isolation brought on by the COVID-19 pandemic have increased loneliness, depression, sadness and other health issues in adolescents and the younger population who need social interaction for their development [Komisar 2021].

To help teens cope with negative emotion, social support has been shown to have a mitigating effect on emotional distress and can act as a buffer in times of stressful life events [Taylor 2011; Alsubaie et al. 2019; Sarason et al. 2001]. Social support is a communicative process focusing on the interpersonal interactions, transactions and/or exchanges

between people in one's network [Dunkel-Schetter et al. 1992; Albrecht and Adelman, 1984]. It is conversational in nature and can be characterized by instances of self-disclosure [Sias and Bartoo 2007] and talking about problems that will lead to aid and comfort from others [Goldsmith, 2014]. Albrecht and Adelman [1984] describe supportive communication as being a "fundamental necessity for well-being and long life". Having conversations about one's feelings has been shown to help teens alleviate their emotional distress [Four Things You Can Do to Support Your Teen's Mental Health, n.d.; Rafaelli and Duckett 1989; Lee and Goldstein 2016]. Sources of social support can include family, friends and other members from one's community (e.g., teachers, coaches, etc.) [Taylor 2011]. During adolescent years, friends may be a particularly important source of social support [Stanton-Salazar and Spina 2005; Gillian 1995]. Peer support groups have been shown to be more important for teens' mental well-being than parents, who might not understand the emotional context of the issues teens face [Barker 2017; Alsubaie et al. 2019]. Research shows that conversations need not be face-to-face in order to create a sense of emotional support; even conversations over the phone (or other means of telecommunications) afford teenagers the ability to discuss "joint concerns" with close friends [Howard 2005].

While supportive communication between people can be a strong deterrent to emotional distress, it is not always readily available. Unfortunately, a friend, a family member or a therapist might not always be available to teens who want (or need) to talk about their emotional and life experiences. A report by the Pew Research Center reported that 23% of American youth (under 18 years old) live in a single-parent household with no other adults, suggesting that low-support households may not be uncommon [Kramer, 2019]. A conversation with a professional therapist could range from \$100 to \$200 per session in the U.S. [Lauretta 2021] and is inaccessible to many people [Xie 2022; Fraga 2021; Pajer 2019]. Teens may also have difficulty seeking social support from their network, particularly for those who are chronically shy or who fear and expect rejection from others [Taylor 2011]. In situations where teens are unable to discuss their problems with people in their direct network, research has shown there are therapeutic benefits to expressing their social-emotional difficulties through self-expressive writing. Expressive writing, like journaling or blogging, creates a space for interpersonal dialogue, where teens can vent and self-talk while working through their thoughts and feelings [Kerner and Fitzpatrick, 2007; Wright and Chung, 2001]. Practicing expressive writing has been found to help adolescents alleviate their emotional distress and cope with life's challenges [Boniel-Nissim and Barak, 2011]. Emotional distress was shown to decrease even further when expressive writing was shared with others through internet blogging (as opposed to private journaling), as it provides reciprocal feedback from others online and can create opportunities for learning [Boniel-Nissim and Barak, 2011]. While research indicates that having an audience during the process of self-disclosure can have even broader benefits [Radcliffe et al., 2007], privacy is a noted concern with forms of online blogging [Park et al., 2021], and communicative feedback from others is not always immediate or guaranteed through these methods.

Conversational technology can partially alleviate these problems by offering private, accessible, convenient, and synchronous communicative solutions [Miner et al. 2016; Carper et al. 2013; Myers et al. 2010] and act as a virtual audience for adolescents to engage with. Fitzpatrick et al. [2017] demonstrated the efficacy of the Woebot CA in decreasing symptoms of depression and anxiety in young people who used it over a period of two weeks. Ly et al. [2017] demonstrated significant improvement in psychological wellbeing and perceived stress in participants engaged in an intervention with Shim, a fully automated CA built as a smartphone app. Shim offered conversations grounded in positive psychology, including expressing gratitude, practicing kindness, engaging in enjoyable activities and replaying positive experiences. Similarly, Jones et al. [2021] found that use of the Amazon Echo for 8 weeks reduced feelings of

loneliness in adults aged 75 or above. Park et al. [2021] designed and tested a chatbot that supports emotional self-disclosure to increase wellbeing. The findings indicated that interactions with the chatbot were successful in promoting self-reflection and insightfulness among participants. O’Dea et al. [2020] evaluated the effectiveness of a relationship-focused CA, WeClick, aimed at improving symptoms of depression, anxiety, and other mental health issues, and found that the use of the app improved the mental health of participants. Philip et al. [2017] showed how an embodied CA designed to diagnose a major depressive disorder (MDD) was perceived by participants as able to “communicate empathy, elicit patient trust, reduce the feeling of being judged by a human, and reduce the emotional barriers to disclose an affective state,” [Philip et al. 2017]. A study by Kim et al. [2018] conducted a workshop with 20 teenagers who were asked to interact with 5 different CAs, design their own agents, and provide feedback on how CAs can best provide emotional support. The results of the study indicated that CAs should be attentive listeners, respect privacy (“secrets”) of its users and provide timely and accurate advice based on user utterances [ibid]. The O’Dea study mentioned above also gathered feedback on potential improvements to CA design, and similarly to the Kim et al. [2018] study, emphasized the importance of designing for accuracy in CA responses, active listening, and including more interactive features.

In order to advance research on developing supportive conversational agents, we conducted participatory design (PD) sessions to facilitate natural teen conversations about their emotional problems, with the aim of informing the content of a CA for teen wellbeing. PD aims to give the users a voice and an active role in technology development by making them members of the design team [Halskov and Hansen 2015; Yip et al. 2017]. PD has occasionally been used in other studies related to the design of conversational agents. Čuš et al. [2021] interviewed adolescents about the design of a digital intervention for non-suicidal self-injury (NSSI). Based on participants' accounts, the study developed recommendations for the design of an effective and engaging digital intervention app and advocated for “evidence based therapeutic approaches” that involve teens, and professionals from the fields of mental health and human-computer interaction (HCI). Garrido et al. [2019] involved 13- to 25-year-olds in the assessment of six mental health apps. Using a focus group method, the researchers aimed to understand the elements of the app that were most desirable to young adults and teens. The findings emphasized the importance of involving the target audience in the design process, where their involvement provided insight on making functions of the app more customizable for the users’ needs and preferences, increasing user engagement with gamification, music, and other interactive features while simultaneously considering access to authoritative information about mental health [Garrido et al. 2019].

While our work shares similarities with the studies previously mentioned [Kim et al. 2018; O’Dea et al. 2020] in that our study engaged teens in discussion related to the design of a supportive CA, the prior studies focused on providing recommendations for the agent’s general design features, while our study expands on this by using participatory design to explore the elements of dialogue in supportive conversations that participants would value in an agent. With the aim of ultimately designing a conversational support agent for teens' wellbeing, we first explored how teens interact with each other, what emotional issues they bring up in conversations with each other, and what solutions they offer to each other in return. The goal of this study was to produce a set of recommendations for the content of a CA that could inform elements of the short supportive conversations for teens who might not be willing/able to talk about their problems to another person.

3 METHODS

With the aim of developing content recommendations, and ultimately a prototype of a conversational app for emotional support of adolescents, we designed a study to explore the following questions:

- RQ1. What emotional issues do teens share with each other and seek conversational support for?
- RQ2. What forms of conversational support do teens offer to each other? What conversational solutions do teens prefer?
- RQ3. Are there differences in emotional issues and conversational solutions of younger and older adolescents?

We defined “adolescents” as 12- to 18-year-olds who are likely to be in the middle and high-school system in the U.S. based on Ladd and Etekal [2013], though other definitions range from a longer period of 10 to 24 years old [Orben et al. 2020] to a shorter period of 13 to 18 years old [Twenge et al. 2019]. Twenty participants were recruited for the study through their caregivers who responded to the messages posted on social media and mailing lists of education communities of [anonymized] area. During the recruitment phase, participants were asked to complete a short demographic questionnaire and indicate their availability for the online focus group sessions. In the fall of 2021, we ran a total of four 1-hour focus group sessions, where two focus group sessions were held with younger teens (12 to 14 years old) and two focus group sessions were held with older teens (15 to 18 years old) (See Fig.1 for a breakdown). Division of teens into younger and older groups was based on the assumption that teens of closer ages have more in common and will be more likely to share their experiences [Knoll et al. 2015; Barrett 1996]. The size of the focus group sessions ranged from 3 to 9 participants (not by design, but because some of our participants missed their initial sessions and joined subsequent sessions).

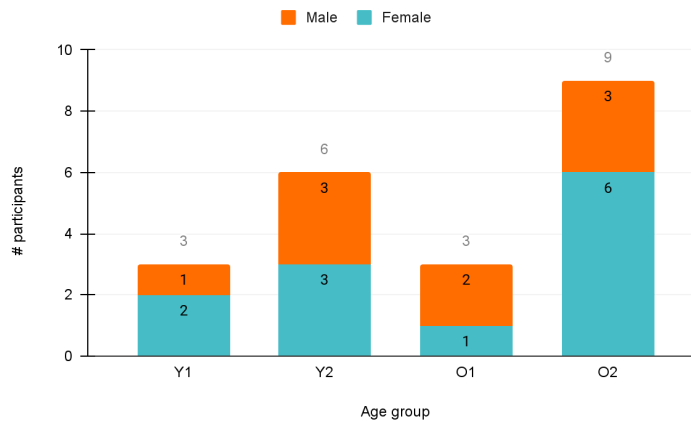


Figure 1: Participants’ distribution across 4 focus group sessions. Y refers to younger groups and O refers to older groups.

To address our RQs, we chose an online focus group method (conducted via Zoom) to facilitate the PD collaboration with teens [Sanders and Stappers 2008]. Focus groups tend to offer a comfortable discussion forum for teens [Adler et al. 2019] and provide rich qualitative data [Rabiee 2004]. In the CA context, focus groups have been used to obtain the impressions of Siri in everyday life [Cowan et al. 2017], discuss the acceptability and feasibility of a CA to promote

healthy habits and physical activity among 5- to 12-year-olds [Carlin et al, 2021], understand adolescent experiences with seeking health-related support [Gudmundsen Høiland et al. 2020], as well as facilitate PD in the creation of a mental-health chatbot [Beilharz et al. 2021].

To help direct the focus group moderator during the sessions, we designed a focus group guide that included directions for the instructions and content to cover, as well as timing of the main discussion points and activities [Greenbaum 2000]. This guide also followed a framework for involving vulnerable populations in PD [Dietrich et al. 2017]. The moderator started the warmup segment by explaining the project and its ultimate aim of developing a supportive CA for teens and provided an instructional overview about the planned activities for the session. Teens participated in the PD activities synchronously through Google Slides, a study tool for facilitating collaboration and production of artifacts for further analysis and insights [Bjorling and Rose 2017; Bevan Jones et al 2020]. Team members' introductions were also included in this segment. Following a warmup exercise, teens participated in a group discussion inspired by the critical incident interview technique [Urquhart et al., 2003], where they were asked to think about and describe a recent incident when they felt upset and had received helpful conversational support from another person. This segment of the group discussion aimed to introduce the main topic of the PD activity and stimulate reflection on situations they have sought support on in the past, and the kind of support they preferred to receive in return. This segment was used as a transition into the session's main PD activity, in which participants were asked to both seek and offer support for problems they've experienced or are currently experiencing and don't mind discussing in a group setting. A role-playing game proceeded, where one participant would 'play' the person in need of support by writing their problem on a sticky note in the slide to begin the conversation. The person who initiated the conversation was referred to as "Me". Then the rest of the participants, referred to as "Friends", would draft responses to the initial problem utterance provided by "Me". Participants documented their conversations in Google Slides (see example of a Slide in Fig. 2).

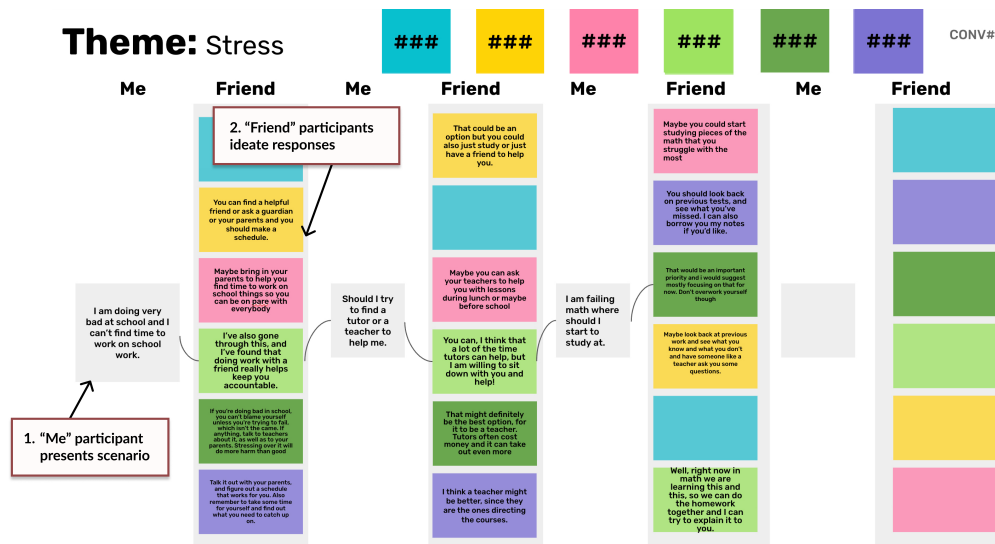


Figure 2: Example of conversation flow captured by Google Slide.

After an initial round of responses from “Friends”, the player “Me” would respond to the answer they liked the most (shown by the connecting lines in Fig. 2), and the conversation would continue until the initial player felt it was exhausted, or the moderator would intervene and stop the flow due to time constraints. In addition to crafting responses and designing the conversation flow, participants were encouraged to explain their responses and reactions to different “Friend” responses. Participants took turns in volunteering to play “Me” and “Friend” roles.

Following recommendations by Dietrich et al. [2017] and Durl et al. [2017], the session also included an evaluative closing segment that gave participants time to fill out an anonymous assessment questionnaire about the session, reflect on the discussion and offer general recommendations to CA designers. Each of the four sessions lasted 90 min. Once the study concluded, participants received a monetary card to an online store for their contribution. The study was approved by the Institutional Review Board.

The findings reported below rely primarily on thematic analysis [Nowell et al. 2017] of the content documented in the Google Slides used by participants to develop conversations, as well as Zoom-generated transcript data pertaining to participants’ explanation of their conversational choices.

4 FINDINGS

A total of 10 unique conversations¹ were initiated across the four sessions: 5 single-turn conversations, 4 double turn and 1 triple turn. Each conversational utterance from the “Me” and “Friends” participants was captured on a Google slide “post-it” (Fig. 2), resulting in a total of 121 “post-it” artifacts: 59 from the younger and 62 from the older participants.

4.1 Emotional Issues Expressed by Teens

Stress was the most common theme that teens in the “Me” roles sought support from their “Friends” (Table 1). Three participants mentioned stress that was caused by a lack of school/work-life balance. Stress caused by academic preparation and interpersonal issues were each mentioned twice, while one teen talked about the stress of immigrating to another country. The theme of boredom came up in three sessions where participants talked about having nothing to do as a result of their increased time alone during the pandemic. One teen mentioned they felt unmotivated from the boredom brought on by decreased social interactions.

Table 1: Themes in initial conversation starters/expressed problems

Theme family/sub-theme in conversation starters (N)		Selected examples
Stress (8^a)	Balancing school and work/life (3)	“Balancing work and school can be difficult sometimes when I work all weekend” [P6].
	School and academic preparation (2)	“I’m really stressed about college applications. I don’t think my essays are good enough” [P4].
	Interpersonal issues (2)	“My friends are arguing a lot and I feel like I am being dragged into the middle. I feel very overwhelmed” [P9]. “My parents are divorcing and I’m really upset about it” [P21].
	Homesickness (1)	“I want to go back to where I was born but my family loves it here and so do I. But I feel like something is missing” [P8].
Boredom (3)		“I’m home alone and have nothing to do” [P1]. “I have been feeling bored and unmotivated during COVID lockdown since I can’t go outside or meet anyone” [P5].

^a One initial utterance included two themes, so while there 10 first utterances, we identified 11 thematic areas in them.

¹ Not all 20 participants had a chance to initiate the conversations due to the time constraints. In moderating the discussion, natural flow of the multi-turn conversation was prioritized over giving each participant a chance to initiate the discussion in the “Me” role. All participants, however, were able to roleplay in the “Friend” role.

4.2 Conversational support that teens offer to each other and prefer

Thematic analysis of the “Friend” responses resulted in two large families of themes related to cognitive and emotional support. These themes were confirmed by social support frameworks that similarly classify types of social support into *cognitive support* - information, advice and/or knowledge sharing that helps one understand and address their situation, and *emotional support* - offer of comfort and nurturance that leads one to feel respected and cared for [Jacobson 1984; Caplan 1974]. Within the cognitive support themes, advice on behavioral strategies to tackle the situation that was causing stress was the most frequently mentioned (Table 2), and included general advice to change one’s own behavior, as well as advice on managing the intricacies of interpersonal relationships. Following advice on behavioral strategies, teens also recommended their peers to seek out additional help from others, including people in a position of authority and peers. Common responses to teens’ problems also included advice to prioritize one’s well-being, as well as advice to reframe one’s way of thinking/feeling about the problem. While cognitive support themes tended to emphasize informational and action-oriented solutions, themes in the emotional support family projected compassion and nurturance. The most frequent type of emotional support offered was validation, which included acknowledgement and reassurance of one’s feelings and/or thoughts, expressions of having had similar feelings/experiences, and expressions of unconditional support. Emotional support was also shown through offerings of companionship and care, which included proposing to spend virtual or in-person time together, offering to be someone to talk to, and checking in on one’s emotional/physical state.

Table 2: Main themes in “Friends” supportive responses

Theme family/ sub-theme in “Friends” supportive responses (N/%)		Selected examples
Cognitive support: support that offers information, advice and/or knowledge sharing that helps one understand and address their situation [Jacobson, 1986]. (113/68%)		
Advice on behavioral strategies to tackle the situation (57/35%)	General advice to change one’s own behavior/strategy (36/22%)	“Maybe you could start studying pieces of the math that you struggle with the most” [P17]. “The friends are too demanding; I would ignore them” [P14].
	Advice on managing interpersonal relationship (21/13%)	“I would take her out to go grab something to eat and talk about the situation. In the end, I’d tell her to walk out of this and let them continue to figure things out” [P10].
Advice to seek help from others (28/17%)	Advice to seek help from person in position of authority (teacher, parent, boss) (19/12%)	“Maybe bring in your parents to help you find time to work on school things so you can be on par with everybody” [P17].

Theme family/ sub-theme in “Friends” supportive responses (N/%)		Selected examples
	Advice to seek help from peers (friends, family, schoolmates) (9/5%)	“See if it will be possible to get help from either friends or family and relatives” [P14].
Advice to prioritize physical/emotional wellbeing (18/11%)		“Remember to take some time for yourself and find out what you need to catch up on” [P20]. “Put yourself first” [P10].
Advice on alternative ways of thinking/feeling to reframe the situation (10/6%)		“... think about the good times you have had where you are now” [P7].
Emotional Support: support that offers comfort and nurturance that leads one to feel respected, admired and cared for [Jacobson, 1986]. (52/32%)		
Offer of validation (33/20%)	Acknowledge/reassure (24/15%)	“I’m sorry to hear that you’re stressed” [P5].
	Express shared feelings/experiences (5/3%)	“I have felt the same way before” [P6].
	Offer of their unconditional support (4/2%)	“You have me and I got your back and will be there for you no matter what” [P10].
Offer of companionship/care (19/11%)	Spend in-person time together (8/5%)	“What are your weekend plans? Want to go to the beach” [P3]?
	Spend remote time together (6/4%)	“Do you want to play a game online [together]” [P1]?
	Offer to be someone to talk with (4/2%)	“Wanna talk about it” [P2]?
	Check in on one’s emotional/physical state (3/2%)	“How’s it going being home alone? Are you bored? Worried” [P2]?

We noted that 70% of “Friends” responses included 2 or more unique themes, often including both cognitive and emotional support themes, for example:

“...I’m so proud of you for adapting to this new place [emotional]. I would definitely talk to your family to arrange a long vacation so you can take back many memories [cognitive]” [P11].

The distribution of cognitive and emotional themes in preferred responses chosen by the teens in the “Me” role closely followed the distribution of the themes in the “Friends” responses (Table 3), with a higher frequency of cognitive support than emotional support themes. Quotes from participants’ justifications for why they chose the responses they preferred indicate that justifications tended to focus on aspects of only one theme, even when several themes were present. For example, even when both cognitive and emotional support themes were present in the preferred response, teens usually just praised one and not the other, as perhaps they only saw one theme as dominant in the response (as such, some of the themes were not directly commented on and therefore do not have quotes for justification in Table 3).

Table 3: Themes, frequencies, and justifications for the chosen “Friends” responses

Theme family/ sub-theme in teens’ preferred responses (N/%)		Quotes from participants’ justifications for selected responses
Cognitive support (37/63%)		
Advice on behavioral strategies to tackle the situation (18/31%)	General advice to change one’s own behavior/strategy (12/20%)	<p>“I like [that response] because [...] of points made [towards] a direction” [P20].</p> <p>“That [response] is most helpful because [...] it's a lot easier for me to do something to figure out a certain situation [...] if they tell me something that I didn't think about, but I understand it” [P8].</p>
	Advice on managing interpersonal relationship (6/10%)	
Advice to prioritize physical/emotional wellbeing (9/15%)		<p>“[That response] is more pleasing because it's offering to have more time to relax and not stress that much over it” [P6].</p> <p>“I like that [the response] told me to just take it easy and not stress too much” [P5].</p> <p>“... I think that it's a good thing to say, you don't have to blame yourself for it” [P21].</p>

Theme family/ sub-theme in teens' preferred responses (N/%)		Quotes from participants' justifications for selected responses
		<p>"I think [that response] was the best because it was saying don't overwork yourself [...] because you don't want to add more stress to an already stressful situation" [P19].</p>
Advice to seek help from others (7/12%)	<p>Advice to seek help from peers (friends, family, schoolmates) (4/7%)</p>	<p>"It's like something that [...] you lead into by casual conversation with the coworkers so yeah. And it's more possible to happen" [P6].</p> <p>"I like when a friend helps you with work [...] and I feel like it's way more personal if it's like a friend helping you" [P19].</p>
	<p>Advice to seek help from person in position of authority (teacher, coach, parent, boss) (3/5%)</p>	<p>"[I like this response because] I also play baseball and you should [be able to] just talk to your coach and just tell them how you're doing in school" [P16].</p> <p>"It would make sense that the school would actually know why I would be behind [on] work, that they may be more understanding of why" [P17].</p>
Advice on alternative ways of thinking/feeling to reframe the situation (3/5%)		
Emotional support (22/37%)		
Offer of validation (17/29%)	<p>Acknowledge/reassure (12/20%)</p>	<p>"I like that "I'm sorry to hear that you're stressed", I think that it acknowledges sort of my feeling so that's a nice part of the response...I think it would be a good one to help [other people] calm down...like some people really like to hear advice, but I think some people also might see that as another thing they have to do. And so, this one might be more relaxing and more [...] just calming" [P4].</p> <p>"I like that [the response] acknowledges what I'm feeling" [P5].</p>

Theme family/ sub-theme in teens' preferred responses (N/%)		Quotes from participants' justifications for selected responses
		"It was nice that it said "things will get better", like being optimistic" [P21].
	Express shared feelings/experiences (3/5%)	"I like that [this response] says that they felt the same way before" [P5]. "[I like this response] because it's as if they stepped into your shoes and they're in your position and they're saying a way to help and really seeing it from your eyes" [P19].
	Offer of their unconditional support (2/3%)	"I like how [the response] said, "I believe in you", because I think that gives a positive energy during tough times" [P5].
Offer of companionship/care (5/8%)	Spend in-person time together (2/3%)	"I felt cared for, I guess, because [they] knew my liking...I like the beach so she knows that [going to the beach together] would make me feel calm" [P1].
	Spend remote time together (2/3%)	
	Checking in on one's emotional/physical state (1/2%)	"For that [response I feel like] I'm cared for, like somebody cares about me, someone is looking over me, making sure I'm okay" [P1].

4.3 Conversational support that teens offer to each other and prefer

Stress and boredom as the main themes of initial conversation starters came up across all age groups; we did not observe any differences in the presence of themes specific to younger or older groups of teens. The types of "Friend" responses to initial prompts were evenly distributed between younger and older participants. In other words, we did not observe that a particular response type, cognitive or emotional, was associated with a group of younger and older teens. Participant responses to each other and the selection of preferred responses tended to be influenced more by an initial prompt, than a participants' ages. For example, the topic of boredom was more frequently mentioned by younger teens resulting in a preference for responses that offered companionship by younger teens.

5 DISCUSSION

5.1 Emotional issues experienced by teens

During the study sessions, our participants sought support for problems related to stress and boredom. Research has shown that stress results from perceiving lack of resources to deal with environmental situations [Lazarus and Folkman 1984; Lohman and Jarvis 2000; Compas et al. 1985], and in reporting stress and stressors, our participants are representative of the general American teenage population. School-related stress caused by the pressure for academic achievement and other expectation management issues is often considered a normal part of a student routine [Student Stress 101: Understanding Academic Stress n.d.; Smith n.d.]. Other common day-to-day stressors related to conflicts with parents, friends, and managing the multiple responsibilities of work and school have also been previously reported in the literature [Compas et al. 1985; Help your teen cope with stress: MedlinePlus Medical Encyclopedia 2020; How to help children and teens manage their stress 2019]. The same is true for participants' reports of the feeling of boredom. Boredom reported by adolescents have been on the rise over the past several years, possibly due to an increase in feelings of depression, or an increase in use of digital technologies [Weybright et al. 2020]. Boredom has been found to be a result of a lack of leisure activities [Wegner 2011], a lack of autonomy when making choices due to external factors, and a lack of stimulating activities [Caldwell et al. 1999], which is in line with the causes of boredom reported by the adolescents in this study. Multiple studies have also found an increase in feelings of boredom among adolescents since the impositions of lockdowns around the world due to the covid-19 pandemic [Forte et al. 2021; Panchal et al. 2021; Singh et al. 2020; Meherali et al. 2021; Janssen et al. 2020], which is again, similar to our findings.

5.2 Conversational support that teens offer to each other and prefer

The main themes in teen responses to each other's problems tended to offer cognitive and emotional support, two key types of social support. Cognitive support focuses on knowledge sharing to help one make sense of a situation, while emotional support focuses on empathetic and comforting responses to one's distress [Sias et al. 2007]. There has been discussion around which type of support is more effective, where some studies have found emotional support to be the most helpful [Burlinson and Goldsmith 1996] while others have found cognitive support to be better for decreasing stress in the long-term [Pauw et al. 2018]. There is also the argument that timing plays a critical role in effectiveness of support, and that the perceived helpfulness of cognitive or emotional support depends on its appropriateness to the situation [Jacobson 1986; Sias et al. 2007].

Cognitive support was the most frequently given type of response by the teens in our study and was also selected the most often as the type of response teens preferred. Within cognitive support, it was common for teens to offer strategic advice on changing one's behavior to cope with the situation at hand, whether that be a self-contained problem or an interpersonal one. A cognitive behavioral-based approach to dealing with interpersonal issues has been effectively used by the previously described app WeClick, designed to help adolescents think differently and provide skills to overcome their relationship challenges using Cognitive Behavior Therapy (CBT) strategies [O'Dea et al. 2020]. WeClick was found to improve the overall wellbeing of adolescents by providing helpful 'advice and direction' to their problems [O'Dea et al., 2020]. Advice to seek out additional help from others was another common response and one that teens often selected as being helpful. It has been noted that teens often turn to seek support from others in times of distress [Galaif et al. 2003], where social networking platforms and other digital communication tools have helped facilitate finding support amongst their peers [Frison and Eggermont 2015] in addition to offline methods. Many teens also report

having non-parental authority figures in their lives that they can turn to (i.e., teachers, coaches, etc.), and these relationships have been shown to be beneficial in supporting adolescent wellbeing [Yu and Deutsch 2021]. Advice to prioritize one's wellbeing was another popular response given by and selected by our participants. Such support may be more attractive for this age group in particular as studies have found that 57% of teens believe mental health is a priority [Barker 2017] and that the younger the generation, the more likely they are to be observant of their mental wellbeing and seek help [How to help children and teens manage their stress 2019].

Within emotional support, validation was the most common response given and selected by teens. Validating responses offered acceptance and understanding without directly trying to advise or change one's situation. Validating responses have been shown to be effective in minimizing the effects of stressors and managing emotional reactivity during stressful situations [Shenk and Fruzzetti 2011]. Social media has become a popular tool for teens to seek this desired validation for their emotional problems [Radovic et al. 2017], though excessive reassurance seeking is a noted concern for this type of social media use. Teens also offered up their own companionship and care as a form of emotional support. Spending digital and/or physical time together with peers can foster intimacy and a sense of belonging that is important for teens [Berndt, 1982]. While synchronous digital companionship (i.e., phone calls, Facetime) can mimic the synchronous communication in face-to-face interactions, in-person companionship may still provide better emotional support [Holtzman et al. 2017].

Another study on social support preferences in adolescents discovered that adolescents found cognitive support (or informational support as it is referred to in [Hombrados-Mendieta et al. 2012] study) to be more important and satisfying than emotional support, echoing our own findings. Still, cognitive support may be considered more effective when coupled with emotional support, as knowledge sharing can be seen as more effective when given in an emotionally supported manner [Dunkel-Schetter et al. 1992]. Teens from our study relayed this notion as they commonly incorporated aspects of both cognitive and emotional support in their responses.

5.3 Differences in emotional issues and responses of younger and older adolescents

The topics of stress and boredom as well as the themes in the preferred conversational support responses were relatively evenly distributed among younger and older participants. Teen's responses to each other and selection of preferred responses tended to be influenced more by an initial prompt than a participants' ages. While we don't question the stages of adolescence that differentiate between younger and older teens based on the central concerns, e.g., belonging, uniqueness [Barrett 1996], self-esteem [Chen 2019] or risk-taking [Knoll et al. 2015], our findings suggest that for the purposes of developing conversational support solutions, the group of 12 through 18-year-olds can be treated similarly.

5.4 Design recommendations

While we acknowledge the limitations of our exploratory participatory study (data coming from a relatively small and demographically homogeneous sample of adolescents), we think that conversations generated by the participants offer helpful insights for the development of the supportive CA apps for teens:

- Explore conversational solutions around teens' everyday stressors. CAs have already been developed to support individuals with chronic forms of stress, like that of post-traumatic stress disorder [Han et al., 2021; Tielman et al., 2014], by providing evidence-based intervention delivery and supporting self-management of care. Shin and Huh-Yoo [2020] discuss a number of Skills available in the Alexa marketplace that promote health and wellness,

some of which directly involve stress management tactics. The stress caused by school, work, relationships with peers and family members was commonly mentioned as a problem by our participants. If these common stressors are frequent in CA user initial utterances (data that perhaps can be confirmed by Google or Amazon), it is worth prioritizing the development of CA content focused on advisable coping strategies to these types of day-to-day stressors.

- Explore CA responses that are centered around both cognitive support advice and emotional support. Some advice within cognitive solutions could be context specific and therefore hard to pre-program (e.g., advice to change behavior/strategy in response to a particular event or interpersonal relationship challenge). Offers of in-person companionship (or a virtual companionship, since it would necessitate support for multi-turn conversation) might currently also be hard for a CA to support. However, a large number of supportive responses from our participants could be used by a CA. For example, it would be relatively “safe” and easy to advise teens to seek help for their problems from peers, family or authority figures. It would also be easy and “safe” to advise teens to prioritize their wellbeing or provide alternative ways of thinking about the problem. An offer of emotional support is also easy to program and is already being currently frequently used by CAs. For example, a user's utterance “I’m feeling stressed” produces an emotionally supportive answer from the Google Assistant in answer “You must have a lot on your mind. How can I help?”. The “feeling depressed” utterance produces a similar response of “I’m sorry to hear that”. While emotional support is important and might be easy to pre-program into the agent, it was less prevalent in the responses given and preferred by the teens in our study. Combining emotional and cognitive support, validation/reassurance with practical advice/information on what to do might offer a better solution. Research examining application of the warmth and competence dimensions [based on the stereotype content model, Fiske, et al. 2007] to the CA domain highlights the merits of combining both compassion and practical/informational advice in CA responses [Lopatovska et al. 2021].
- Solutions can benefit large groups. Since we did not observe age differences in teen problems and offered support, we would hypothesize that the solutions discussed in this paper could work for a larger group of younger and older adolescents. Future work might also explore if responses grounded in cognitive and emotional support can also appeal to other groups and adults.

We hope that the recommendations derived from teens’ conversations in our study will advance development of supportive CAs for adolescents. We also hope that adolescents and other user groups will have ample opportunities to directly contribute to the design of conversational solutions attuned to their needs. Our own future plans include continuous collaboration with teens on designing and testing a prototype of the supportive agent.

6 CONCLUSION

While COVID-19 related stress might be winding down in some areas, adolescents will continue to experience heightened emotions and supporting them in these challenging times of their development will remain important. We asked teens to talk about their emotional problems and design supportive dialogs with each other. We hope that their stories will help designers to develop better CAs for adolescents and their contexts, and to promote the use of participatory design methods to hear perspectives from the user groups they are designing for.

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REFERENCES

- [1] Kristin Adler, Sanna Salanterä, and Maya Zumstein-Shaha. 2019. Focus Group Interviews in Child, Youth, and Parent Research: An Integrative Literature Review. *International Journal of Qualitative Methods* 18, (January 2019), 1609406919887274. DOI:<https://doi.org/10.1177/1609406919887274>
- [2] Terrance L. Albrecht and Mara B. Adelman. 1984. SOCIAL SUPPORT AND LIFE STRESS.: New Directions for Communication Research. *Human Comm Res* 11, 1 (September 1984), 3–32. DOI:<https://doi.org/10.1111/j.1468-2958.1984.tb00036.x>
- [3] M. M. Alsubaie, H. J. Stain, L. A. D. Webster, and R. Wadman. 2019. The role of sources of social support on depression and quality of life for university students. *International Journal of Adolescence and Youth* 24, 4 (October 2019), 484–496. DOI:<https://doi.org/10.1080/02673843.2019.1568887>
- [4] Annalena Nora Baecker, Denise Y. Geiskkovitch, Adriana Lorena González, and James E. Young. 2020. Emotional Support Domestic Robots for Healthy Older Adults: Conversational Prototypes to Help With Loneliness. In *Companion of the 2020 ACM/IEEE International Conference on Human-Robot Interaction (HRI '20)*, Association for Computing Machinery, New York, NY, USA, 122–124. DOI:<https://doi.org/10.1145/3371382.3378279>
- [5] Jenny Barker. 2017. Mental Health – A Priority, and Struggle, for Young People. *PresenceLearning*. Retrieved February 14, 2022 from <https://www.presencelearning.com/blog/mental-health-a-priority-and-struggle-for-young-people/>
- [6] David E. Barrett. 1996. The Three Stages of Adolescence. *The High School Journal* 79, 4 (1996), 333–339.
- [7] Francesca Beilharz, Suku Sukunesan, Susan L. Rossell, Jayashri Kulkarni, and Gemma Sharp. 2021. Development of a Positive Body Image Chatbot (KIT) With Young People and Parents/Carers: Qualitative Focus Group Study. *Journal of Medical Internet Research* 23, 6 (June 2021), e27807. DOI:<https://doi.org/10.2196/27807>
- [8] Thomas J. Berndt. 1982. The Features and Effects of Friendship in Early Adolescence. *Child Development* 53, 6 (1982), 1447–1460. DOI:<https://doi.org/10.2307/1130071>
- [9] Rhys Bevan Jones, Paul Stallard, Sharifah Shameem Agha, Simon Rice, Aliza Werner-Seidler, Karolina Stasiak, Jason Kahn, Sharon A. Simpson, Mario Alvarez-Jimenez, Frances Rice, Rhiannon Evans, and Sally Merry. 2020. Practitioner review: Co-design of digital mental health technologies with children and young people. *Journal of Child Psychology and Psychiatry* 61, 8 (2020), 928–940. DOI:<https://doi.org/10.1111/jcpp.13258>
- [10] Elin A. Björling and Emma Rose. 2019. Participatory Research Principles in Human-Centered Design: Engaging Teens in the Co-Design of a Social Robot. *Multimodal Technologies and Interaction* 3, 1 (March 2019), 8. DOI:<https://doi.org/10.3390/mti3010008>
- [11] Meyran Boniel-Nissim and Azy Barak. 2013. The therapeutic value of adolescents' blogging about social–emotional difficulties. *Psychological Services* 10, 3 (2013), 333–341. DOI:<https://doi.org/10.1037/a0026664>
- [12] Brant R. Burleson. 2008. What Counts as Effective Emotional Support? Explorations of Individual and Situational Differences. In *Studies in Applied Interpersonal Communication*. SAGE Publications, Inc., 2455 Teller Road, Thousand Oaks California 91320 United States of America, 207–228. DOI:<https://doi.org/10.4135/9781412990301.d14>
- [13] Brant R. Burleson and Daena J. Goldsmith. 1996. How the comforting process works. In *Handbook of Communication and Emotion*. Elsevier, 245–280. DOI:<https://doi.org/10.1016/B978-012057770-5/50011-4>
- [14] Linda L. Caldwell, Nancy Darling, Laura L. Payne, and Bonnie Dowdy. 1999. “Why are You Bored?”: An Examination of Psychological and Social Control Causes of Boredom Among Adolescents. *Journal of Leisure Research* 31, 2 (June 1999), 103–121. DOI:<https://doi.org/10.1080/00222216.1999.11949853>
- [15] Gerald Caplan. 1974. Support systems and community mental health: Lectures on concept development. Behavioral Publications, Pasadena, CA, US.
- [16] Angela Carlin, Caomhan Logue, Jonathan Flynn, Marie H. Murphy, and Alison M. Gallagher. 2021. Development and Feasibility of a Family-Based Health Behavior Intervention Using Intelligent Personal Assistants: Randomized Controlled Trial. *JMIR Form Res* 5, 1 (January 2021), e17501. DOI:<https://doi.org/10.2196/17501>
- [17] Matthew M. Carper, R. Kathryn McHugh, and David H. Barlow. 2013. The dissemination of computer-based psychological treatment: a preliminary analysis of patient and clinician perceptions. *Adm Policy Ment Health* 40, 2 (March 2013), 87–95. DOI:<https://doi.org/10.1007/s10488-011-0377-5>
- [18] Verolien Cauberghe, Ini Van Wesenbeeck, Steffi De Jans, Liselot Hudders, and Koen Ponnet. 2021. How Adolescents Use Social Media to Cope with Feelings of Loneliness and Anxiety During COVID-19 Lockdown. *Cyberpsychology, Behavior, and Social Networking* 24, 4 (April 2021), 250–257. DOI:<https://doi.org/10.1089/cyber.2020.0478>
- [19] Kun-Hu Chen. 2019. Self-identity and self-esteem during different stages of adolescence: The function of identity importance and identity firmness. *Chinese Journal of Guidance and Counseling* 55, (2019), 27–56.
- [20] Bruce E. Compas. 1987. Stress and life events during childhood and adolescence. *Clinical Psychology Review* 7, 3 (January 1987), 275–302. DOI:[https://doi.org/10.1016/0272-7358\(87\)90037-7](https://doi.org/10.1016/0272-7358(87)90037-7)
- [21] Bruce E. Compas, Glen E. Davis, and Carolyn J. Forsythe. 1985. Characteristics of life events during adolescence. *American Journal of Community*

- Psychology* 13, 6 (December 1985), 677–691. DOI:<https://doi.org/10.1007/BF00929795>
- [22] Benjamin R. Cowan, Nadia Pantidi, David Coyle, Kellie Morrissey, Peter Clarke, Sara Al-Shehri, David Earley, and Natasha Bandeira. 2017. “What can I help you with?”: infrequent users’ experiences of intelligent personal assistants. *Association for Computing Machinery (ACM)*, 1–12. DOI:<https://doi.org/10.1145/3098279.3098539>
- [23] Anja Čuš, Julian Edbrooke-Childs, Susanne Ohmann, Paul L. Plener, and Türkan Akkaya-Kalayci. 2021. “Smartphone Apps Are Cool, But Do They Help Me?”: A Qualitative Interview Study of Adolescents’ Perspectives on Using Smartphone Interventions to Manage Nonsuicidal Self-Injury. *International Journal of Environmental Research and Public Health* 18, 6 (January 2021), 3289. DOI:<https://doi.org/10.3390/ijerph18063289>
- [24] Irene H. A. De Goede, Susan J. T. Branje, Marc J. M. H. Delsing, and Wim H. J. Meeus. 2009. Linkages Over Time Between Adolescents’ Relationships with Parents and Friends. *J Youth Adolescence* 38, 10 (November 2009), 1304–1315. DOI:<https://doi.org/10.1007/s10964-009-9403-2>
- [25] Timo Dietrich, Jakob Trischler, Lisa Schuster, and Sharyn Rundle-Thiele. 2017. Co-designing services with vulnerable consumers. *Journal of Service Theory and Practice* 27, 3 (January 2017), 663–688. DOI:<https://doi.org/10.1108/JSTP-02-2016-0036>
- [26] Michelle Drouin, Brandon T. McDaniel, Jessica Pater, and Tammy Toscos. 2020. How Parents and Their Children Used Social Media and Technology at the Beginning of the COVID-19 Pandemic and Associations with Anxiety. *Cyberpsychology, Behavior, and Social Networking* 23, 11 (November 2020), 727–736. DOI:<https://doi.org/10.1089/cyber.2020.0284>
- [27] Christine Dunkel-Schetter, David E. Blasband, Lawrence G. Feinstein, and Tracy Bennett Herbert. 1992. Elements of supportive interactions: When are attempts to help effective? In *Helping and being helped: Naturalistic studies*. Sage Publications, Inc, Thousand Oaks, CA, US, 83–114.
- [28] James Durl, Jakob Trischler, and Timo Dietrich. 2017. Co-designing with young consumers – reflections, challenges and benefits. *Young Consumers* 18, 4 (January 2017), 439–455. DOI:<https://doi.org/10.1108/YC-08-2017-00725>
- [29] Kathleen Kara Fitzpatrick, Alison Darcy, and Molly Vierhile. 2017. Delivering cognitive behavior therapy to young adults with symptoms of depression and anxiety using a fully automated conversational agent (Woebot): a randomized controlled trial. *JMIR Mental Health* 4, 2 (June 2017), e19. DOI:<https://doi.org/10.2196/mental.7785>
- [30] Alberto Forte, Massimiliano Orri, Martina Brandizzi, Cecilia Iannaco, Paola Venturini, Daniela Liberato, Claudia Battaglia, Isabel Nöthen-Garunja, Maria Vulcan, Asja Brusic, Lauro Quadrana, Olivia Cox, Sara Fabbri, and Elena Monducci. 2021. “My Life during the Lockdown”: Emotional Experiences of European Adolescents during the COVID-19 Crisis. *International Journal of Environmental Research and Public Health* 18, 14 (January 2021), 7638. DOI:<https://doi.org/10.3390/ijerph18147638>
- [31] Juli Fraga. 2022. 7 Affordable Therapy Options. *Healthline*. Retrieved February 26, 2022 from <https://www.healthline.com/health/therapy-for-every-budget>
- [32] Robert M. Friedman and Krista Kutash. 1992. Challenges For Child And Adolescent Mental Health. *Health Affairs* 11, 3 (January 1992), 125–136. DOI:<https://doi.org/10.1377/hlthaff.11.3.125>
- [33] Eline Frison and Steven Eggermont. 2015. The impact of daily stress on adolescents’ depressed mood: The role of social support seeking through Facebook. *Computers in Human Behavior* 44, (March 2015), 315–325. DOI:<https://doi.org/10.1016/j.chb.2014.11.070>
- [34] Silvia Gabrielli, Silvia Rizzi, Giulia Bassi, Sara Carbone, Rosa Maimone, Michele Marchesoni, and Stefano Forti. 2021. Engagement and Effectiveness of a Healthy-Coping Intervention via Chatbot for University Students During the COVID-19 Pandemic: Mixed Methods Proof-of-Concept Study. *JMIR mHealth and uHealth* 9, 5 (May 2021), e27965. DOI:<https://doi.org/10.2196/27965>
- [35] Elisha R. Galaif, Steve Sussman, Chih-Ping Chou, and Thomas A. Wills. 2003. Longitudinal Relations Among Depression, Stress, and Coping in High Risk Youth. *Journal of Youth and Adolescence* 32, 4 (August 2003), 243–258. DOI:<https://doi.org/10.1023/A:1023028809718>
- [36] Paula M. Gardiner, Kelly D. McCue, Lily M. Negash, Teresa Cheng, Laura F. White, Leanne Yinusa-Nyahkoon, Brian W. Jack, and Timothy W. Bickmore. 2017. Engaging women with an embodied conversational agent to deliver mindfulness and lifestyle recommendations: A feasibility randomized control trial. *Patient Educ Couns* 100, 9 (September 2017), 1720–1729. DOI:<https://doi.org/10.1016/j.pec.2017.04.015>
- [37] Sandra Garrido, Daniel Cheers, Katherine Boydell, Quang Vinh Nguyen, Emery Schubert, Laura Dunne, and Tanya Meade. 2019. Young People’s Response to Six Smartphone Apps for Anxiety and Depression: Focus Group Study. *JMIR Mental Health* 6, 10 (October 2019), e14385. DOI:<https://doi.org/10.2196/14385>
- [38] Daena Goldsmith. 2004. *Communicating Social Support*. Cambridge University Press, Cambridge, UK. Retrieved from <https://login.ezproxy.pratt.edu/login?url=https://search.ebscohost.com/login.aspx?direct=true&db=nlebk&AN=527565&site=eds-live&scope=site>
- [39] Thomas Greenbaum. 2000. *Moderating Focus Groups: A Practical Guide for Group Facilitation*. Thousand Oaks, California. DOI:<https://doi.org/10.4135/9781483328522>
- [40] Camilla Gudmundsen Høiland, Asbjørn Følstad, Asbjørn Følstad, and Amela Karahasanovic. Hi, can I help? Exploring how to design a mental health chatbot for youths | Human Technology. *Human Technology* 16, 2, 139–169.
- [41] Kim Halskov and Nicolai Brodersen Hansen. 2015. The diversity of participatory design research practice at PDC 2002–2012. *International Journal of Human-Computer Studies* 74, (February 2015), 81–92. DOI:<https://doi.org/10.1016/j.ijhcs.2014.09.003>.
- [42] Hee Jeong Han, Sanjana Mendu, Beth K Jaworski, Jason E Owen, and Saeed Abdullah. 2021. PTSDialogue: Designing a Conversational Agent to Support Individuals with Post-Traumatic Stress Disorder. In *Adjunct Proceedings of the 2021 ACM International Joint Conference on Pervasive and Ubiquitous Computing and Proceedings of the 2021 ACM International Symposium on Wearable Computers*, ACM, Virtual USA, 198–203. DOI:<https://doi.org/10.1145/3460418.3479332>
- [43] Camilla Gudmundsen Høiland, Asbjørn Følstad, Asbjørn Følstad, and Amela Karahasanovic. Hi, can I help? Exploring how to design a mental health chatbot for youths | Human Technology. *Human Technology* 16, 2, 139–169.
- [44] Susan Holtzman, Drew DeClerck, Kara Turcotte, Diana Lisi, and Michael Woodworth. 2017. Emotional support during times of stress: Can text messaging compete with in-person interactions? *Computers in Human Behavior* 71, (June 2017), 130–139.

DOI:<https://doi.org/10.1016/j.chb.2017.01.043>

- [45] Ma Isabel Hombrados-Mendieta, Luis Gomez-Jacinto, Juan Manuel Dominguez-Fuentes, Patricia Garcia-Leiva, and Margarita Castro-Travé. 2012. TYPES OF SOCIAL SUPPORT PROVIDED BY PARENTS, TEACHERS, AND CLASSMATES DURING ADOLESCENCE: Social Support Provided by Parents, Teachers, and Classmates. *J. Community Psychol.* 40, 6 (August 2012), 645–664. DOI:<https://doi.org/10.1002/jcop.20523>
- [46] Sue Howard. 2005. *Wired Up: Young People And The Electronic Media*. Routledge.
- [47] David E. Jacobson. 1986. Types and Timing of Social Support. *Journal of Health and Social Behavior* 27, 3 (1986), 250–264. DOI:<https://doi.org/10.2307/2136745>
- [48] Loes H. C. Janssen, Marie-Louise J. Kullberg, Bart Verkuil, Noa van Zwieten, Mirjam C. M. Wever, Lisanne A. E. M. van Houtum, Wilma G. M. Wentholt, and Bernet M. Elzinga. 2020. Does the COVID-19 pandemic impact parents' and adolescents' well-being? An EMA-study on daily affect and parenting. *PLOS ONE* 15, 10 (October 2020), e0240962. DOI:<https://doi.org/10.1371/journal.pone.0240962>
- [49] Valerie K. Jones, Michael Hanus, Changmin Yan, Marcia Y. Shade, Julie Blaskewicz Boron, and Rafael Maschieri Bicudo. 2021. Reducing Loneliness Among Aging Adults: The Roles of Personal Voice Assistants and Anthropomorphic Interactions. *Frontiers in Public Health* 9, (2021). Retrieved February 28, 2022 from <https://www.frontiersin.org/article/10.3389/fpubh.2021.750736>
- [50] Emily A. Kerner and Marilyn R. Fitzpatrick. 2007. Integrating writing into psychotherapy practice: A matrix of change processes and structural dimensions. *Psychotherapy: Theory, Research, Practice, Training* 44, 3 (2007), 333–346. DOI:<https://doi.org/10.1037/0033-3204.44.3.333>
- [51] Junhan Kim, Yoojung Kim, Byungjoon Kim, Sukyung Yun, Minjoon Kim, and Joongseek Lee. 2018. Can a Machine Tend to Teenagers' Emotional Needs? A Study with Conversational Agents. In *Extended Abstracts of the 2018 CHI Conference on Human Factors in Computing Systems (CHI EA '18)*, Association for Computing Machinery, New York, NY, USA, 1–6. DOI:<https://doi.org/10.1145/3170427.3188548>
- [52] Lisa J. Knoll, Lucia Magis-Weinberg, Maarten Speekenbrink, and Sarah-Jayne Blakemore. 2015. Social Influence on Risk Perception During Adolescence. *Psychol Sci* 26, 5 (May 2015), 583–592. DOI:<https://doi.org/10.1177/0956797615569578>
- [53] Erica Komisar. 2021. I'm A Therapist Working With Children And Families. Here's How COVID-19 Is Affecting Them. *HuffPost*. Retrieved October 27, 2021 from https://www.huffpost.com/entry/child-therapist-covid-19_n_6030234bc5b67c32961d9f6a
- [54] Stephanie Kramer. 2019. U.S. has world's highest rate of children living in single-parent households. *Pew Research Center*. Retrieved February 16, 2022 from <https://www.pewresearch.org/fact-tank/2019/12/12/u-s-children-more-likely-than-children-in-other-countries-to-live-with-just-one-parent/>
- [55] Gary W. Ladd and Idean Ettekal. 2013. Peer-related loneliness across early to late adolescence: normative trends, intra-individual trajectories, and links with depressive symptoms. *J Adolesc* 36, 6 (December 2013), 1269–1282. DOI:<https://doi.org/10.1016/j.adolescence.2013.05.004>
- [56] Ashley Laurretta. 2021. How Much Does Therapy Cost? *Forbes Health*. Retrieved February 26, 2022 from <https://www.forbes.com/health/mind/how-much-does-therapy-cost/>
- [57] Chih-Yuan Steven Lee and Sara E. Goldstein. 2016. Loneliness, Stress, and Social Support in Young Adulthood: Does the Source of Support Matter? *J Youth Adolescence* 45, 3 (March 2016), 568–580. DOI:<https://doi.org/10.1007/s10964-015-0395-9>
- [58] Pierpaolo Limone and Giusi Antonia Toto. 2021. Psychological and Emotional Effects of Digital Technology on Children in COVID-19 Pandemic. *Brain Sciences* 11, 9 (September 2021), 1126. DOI:<https://doi.org/10.3390/brainsci11091126>
- [59] Brenda Jo Lohman and Patricia A. Jarvis. 2000. Adolescent Stressors, Coping Strategies, and Psychological Health Studied in the Family Context. *Journal of Youth and Adolescence* 29, 1 (February 2000), 15–43. DOI:<https://doi.org/10.1023/A:1005117020812>
- [60] Kien Hoa Ly, Ann-Marie Ly, and Gerhard Andersson. 2017. A fully automated conversational agent for promoting mental well-being: A pilot RCT using mixed methods. *Internet Interv* 10, (October 2017), 39–46. DOI:<https://doi.org/10.1016/j.invent.2017.10.002>
- [61] Salima Meherali, Neelam Punjani, Samantha Louie-Poon, Komal Abdul Rahim, Jai K. Das, Rehana A. Salam, and Zohra S. Lassi. 2021. Mental Health of Children and Adolescents Amidst COVID-19 and Past Pandemics: A Rapid Systematic Review. *International Journal of Environmental Research and Public Health* 18, 7 (January 2021), 3432. DOI:<https://doi.org/10.3390/ijerph18073432>
- [62] Christian Meske, Ireti Amojó, and Devinder Thapa. 2020. Understanding the Affordances of Conversational Agents in Mental Mobile Health Services.
- [63] Adam S. Miner, Arnold Milstein, Stephen Schueller, Roshini Hegde, Christina Mangurian, and Eleni Linos. 2016. Smartphone-Based Conversational Agents and Responses to Questions About Mental Health, Interpersonal Violence, and Physical Health. *JAMA Intern Med* 176, 5 (May 2016), 619–625. DOI:<https://doi.org/10.1001/jamainternmed.2016.0400>
- [64] P. Muppirishetty and Minha Lee. 2020. Voice User Interfaces for mental healthcare: Leveraging technology to help our inner voice. In *ACM Conference on Computer-Supported Cooperative Work and Social Computing*, ACM, Held Virtually. Retrieved from <http://www.speech-interaction.org/CSCW2020/papers/7-Muppirishetty.pdf>
- [65] Kathleen M. Myers, Ann Vander Stoep, Carolyn A. McCarty, Jesse B. Klein, Nancy B. Palmer, John R. Geyer, and Sanford M. Melzer. 2010. Child and adolescent telepsychiatry: variations in utilization, referral patterns and practice trends. *J Telemed Telecare* 16, 3 (2010), 128–133. DOI:<https://doi.org/10.1258/jtt.2009.090712>
- [66] Jacqueline Nesi, Sophia Choukas-Bradley, and Mitchell J. Prinstein. 2018. Transformation of Adolescent Peer Relations in the Social Media Context: Part 1—A Theoretical Framework and Application to Dyadic Peer Relationships. *Clin Child Fam Psychol Rev* 21, 3 (September 2018), 267–294. DOI:<https://doi.org/10.1007/s10567-018-0261-x>
- [67] Lorelli S. Nowell, Jill M. Norris, Deborah E. White, and Nancy J. Moules. 2017. Thematic Analysis: Striving to Meet the Trustworthiness Criteria. *International Journal of Qualitative Methods* 16, 1 (December 2017), 1609406917733847. DOI:<https://doi.org/10.1177/1609406917733847>
- [68] Bridianne O'Dea, Jin Han, Philip J. Batterham, Melinda R. Achilles, Alison L. Calear, Aliza Werner-Seidler, Belinda Parker, Fiona Shand, and Helen Christensen. 2020. A randomised controlled trial of a relationship-focussed mobile phone application for improving adolescents' mental health. *Journal of Child Psychology and Psychiatry* 61, 8 (2020), 899–913. DOI:<https://doi.org/10.1111/jcpp.13294>

- [69] Amy Orben, Livia Tomova, and Sarah-Jayne Blakemore. 2020. The effects of social deprivation on adolescent development and mental health. *Lancet Child Health* 4, 8 (August 2020), 634–640. DOI:[https://doi.org/10.1016/S2352-4642\(20\)30186-3](https://doi.org/10.1016/S2352-4642(20)30186-3)
- [70] Nicole Pajer. 2017. Why Is Therapy So Expensive? *HuffPost*. Retrieved February 26, 2022 from https://www.huffpost.com/entry/therapy-expensive-insurance_n_5900048ee4b0af6d718992e7
- [71] Urvashi Panchal, Gonzalo Salazar de Pablo, Macarena Franco, Carmen Moreno, Mara Parellada, Celso Arango, and Paolo Fusar-Poli. 2021. The impact of COVID-19 lockdown on child and adolescent mental health: systematic review. *Eur Child Adolesc Psychiatry* (August 2021). DOI:<https://doi.org/10.1007/s00787-021-01856-w>
- [72] SoHyun Park, Anja Thieme, Jeongyun Han, Sungwoo Lee, Wonjong Rhee, and Bongwon Suh. 2021. “I wrote as if I were telling a story to someone I knew.”: Designing Chatbot Interactions for Expressive Writing in Mental Health. In *Designing Interactive Systems Conference 2021*, ACM, Virtual Event USA, 926–941. DOI:<https://doi.org/10.1145/3461778.3462143>
- [73] Lisanne S. Pauw, Disa A. Sauter, Gerben A. van Kleef, and Agneta H. Fischer. 2018. Sense or sensibility? Social sharers’ evaluations of socio-affective vs. cognitive support in response to negative emotions. *Cognition and Emotion* 32, 6 (August 2018), 1247–1264. DOI:<https://doi.org/10.1080/02699931.2017.1400949>
- [74] Richard S. Lazarus PhD and Susan Folkman PhD. 1984. *Stress, Appraisal, and Coping*. Springer Publishing Company.
- [75] Pierre Philip, Jean-Arthur Micoulaud-Franchi, Patricia Sagaspe, Etienne De Sevin, Jérôme Olive, Stéphanie Bioulac, and Alain Sauteraud. 2017. Virtual human as a new diagnostic tool, a proof of concept study in the field of major depressive disorders. *Sci Rep* 7, (February 2017), 42656. DOI:<https://doi.org/10.1038/srep42656>
- [76] Bettina F. Piko and Csaba Hamvai. 2010. Parent, school and peer-related correlates of adolescents’ life satisfaction. *Children and Youth Services Review* 32, 10 (October 2010), 1479–1482. DOI:<https://doi.org/10.1016/j.childyouth.2010.07.007>
- [77] Fatemeh Rabiee. 2004. Focus-group interview and data analysis. *Proceedings of the Nutrition Society* 63, 4 (November 2004), 655–660. DOI:<https://doi.org/10.1079/PNS2004399>
- [78] Alison M. Radcliffe, Mark A. Lumley, Jessica Kendall, Jennifer K. Stevenson, and Joyce Beltran. 2007. Written Emotional Disclosure: Testing Whether Social Disclosure Matters. *Journal of Social and Clinical Psychology* 26, 3 (March 2007), 362–384. DOI:<https://doi.org/10.1521/jscp.2007.26.3.362>
- [79] Ana Radovic, Theresa Gmelin, Bradley D. Stein, and Elizabeth Miller. 2017. Depressed adolescents’ positive and negative use of social media. *Journal of Adolescence* 55, (February 2017), 5–15. DOI:<https://doi.org/10.1016/j.adolescence.2016.12.002>
- [80] Marcela Raffaelli and Elena Duckett. 1989. “We were just talking ...”: Conversations in early adolescence. *J Youth Adolescence* 18, 6 (December 1989), 567–582. DOI:<https://doi.org/10.1007/BF02139074>
- [81] Elizabeth B.-N. Sanders and Pieter Jan Stappers. 2008. Co-creation and the new landscapes of design. *CoDesign* 4, 1 (March 2008), 5–18. DOI:<https://doi.org/10.1080/15710880701875068>
- [82] Barbara R. Sarason, Irwin G. Sarason, and Regan A. R. Gurung. 2001. Close personal relationships and health outcomes: A key to the role of social support. In *Personal relationships: Implications for clinical and community psychology*. John Wiley & Sons Ltd, New York, NY, US, 15–41.
- [83] Hashini Senaratne, Kirsten Ellis, Sharon Oviatt, and Glenn Melvin. 2019. Designing Efficacious Mobile Technologies for Anxiety Self-Regulation. In *Extended Abstracts of the 2019 CHI Conference on Human Factors in Computing Systems* (CHI EA ’19), ACM, New York, NY, USA, 1–6. DOI:<https://doi.org/10.1145/3290607.3312766>
- [84] Chad E. Shenk and Alan E. Fruzzetti. 2011. The Impact of Validating and Invalidating Responses on Emotional Reactivity. *Journal of Social and Clinical Psychology* 30, 2 (February 2011), 163–183. DOI:<https://doi.org/10.1521/jscp.2011.30.2.163>
- [85] Ji Youn Shin and Jina Huh-Yoo. 2020. Designing Everyday Conversational Agents for Managing Health and Wellness: A Study of Alexa Skills Reviews. In *Proceedings of the 14th EAI International Conference on Pervasive Computing Technologies for Healthcare*, ACM, Atlanta GA USA, 50–61. DOI:<https://doi.org/10.1145/3421937.3422024>
- [86] Patricia M. Sias and Heidi Bartoo. 2007. Friendship, Social Support, and Health. In *Low-Cost Approaches to Promote Physical and Mental Health: Theory, Research, and Practice*, Luciano L’Abate (ed.), Springer, New York, NY, 455–472. DOI:https://doi.org/10.1007/0-387-36899-X_23
- [87] Shweta Singh, Deblina Roy, Kritika Sinha, Sheeba Parveen, Ginni Sharma, and Gunjan Joshi. 2020. Impact of COVID-19 and lockdown on mental health of children and adolescents: A narrative review with recommendations. *Psychiatry Research* 293, (November 2020), 113429. DOI:<https://doi.org/10.1016/j.psychres.2020.113429>
- [88] Kathleen Smith. 6 Common Triggers of Teen Stress. *Psycom*. Retrieved February 16, 2022 from <https://www.psycom.net/common-triggers-teen-stress/>
- [89] Ricardo D. Stanton-Salazar and Stephanie Urso Spina. 2005. Adolescent Peer Networks as a Context for Social and Emotional Support. *Youth & Society* 36, 4 (June 2005), 379–417. DOI:<https://doi.org/10.1177/0044118X04267814>
- [90] Shelley E. Taylor. 2011. *Social Support: A Review*. Oxford University Press. DOI:<https://doi.org/10.1093/oxfordhb/9780195342819.013.0009>
- [91] Myrthe Tielman, Willem-Paul Brinkman, and Mark A. Neerinx. 2014. Design Guidelines for a Virtual Coach for Post-Traumatic Stress Disorder Patients. In (Lecture Notes in Computer Science), Springer International Publishing, Cham, 434–437. DOI:https://doi.org/10.1007/978-3-319-09767-1_54
- [92] Gillian Turner. 1999. Peer support and young people’s health. *Journal of Adolescence* 22, 4 (August 1999), 567–572. DOI:<https://doi.org/10.1006/jado.1999.0249>
- [93] Jean M. Twenge and Heejung Park. 2019. The Decline in Adult Activities Among U.S. Adolescents, 1976–2016. *Child Development* 90, 2 (2019), 638–654. DOI:<https://doi.org/10.1111/cdev.12930>

- [94] Christine Urquhart, Ann Light, Rhian Thomas, Anne Barker, Alison Yeoman, Jan Cooper, Chris Armstrong, Roger Fenton, Ray Lonsdale, and Siân Spink. 2003. Critical incident technique and explication interviewing in studies of information behavior. *Library & Information Science Research* 25, 1 (March 2003), 63–88. DOI:[https://doi.org/10.1016/S0740-8188\(02\)00166-4](https://doi.org/10.1016/S0740-8188(02)00166-4)
- [95] Lisa Wegner. 2011. Through the lens of a peer: Understanding leisure boredom and risk behaviour in adolescence. *South African Journal of Occupational Therapy* 41, 1 (2011), 19–23.
- [96] Elizabeth H. Weybright, John Schulenberg, and Linda L. Caldwell. 2020. More Bored Today Than Yesterday? National Trends in Adolescent Boredom From 2008 to 2017. *Journal of Adolescent Health* 66, 3 (March 2020), 360–365. DOI:<https://doi.org/10.1016/j.jadohealth.2019.09.021>
- [97] Jeannie Wright and Man Cheung Chung. 2001. Mastery or mystery? Therapeutic writing: A review of the literature. *British Journal of Guidance & Counselling* 29, 3 (August 2001), 277–291. DOI:<https://doi.org/10.1080/03069880120073003>
- [98] Teresa Xie. 2022. College Students Struggle to Address a Mental Health Crisis. *The Nation*. Retrieved February 26, 2022 from <https://www.thenation.com/article/society/college-students-covid-mental-health/>
- [99] Spring Yan. 2021. COVID-19 and technology use by teenagers: A case study. *Human Behavior and Emerging Technologies* 3, 1 (2021), 185–193. DOI:<https://doi.org/10.1002/hbe2.236>
- [100] Jason C. Yip, Kiley Sobel, Caroline Pitt, Kung Jin Lee, Sijin Chen, Kari Nasu, and Laura R. Pina. 2017. Examining Adult-Child Interactions in Participatory Design. In *Proceedings of the 2017 CHI Conference on Human Factors in Computing Systems*, 5742–5754. DOI:<https://doi.org/10.1145/3025453.3025787>
- [101] Mark Vincent B. Yu and Nancy L. Deutsch. 2021. Aligning social support to youth’s developmental needs: The role of nonparental youth–adult relationships in early and late adolescence. *Applied Developmental Science* 25, 2 (April 2021), 133–149. DOI:<https://doi.org/10.1080/10888691.2018.1548940>
- [102] 2019. Stress Management and Teens. *American Academy of Child and Adolescent Psychiatry*. Retrieved February 28, 2022 from https://www.aacap.org/AACAP/Families_and_Youth/Facts_for_Families/FFF-Guide/Helping-Teenagers-With-Stress-066.aspx
- [103] 2019. How to help children and teens manage their stress. *American Psychological Association*. Retrieved February 17, 2022 from <https://www.apa.org/topics/child-development/stress>
- [104] 2020. Help your teen cope with stress: MedlinePlus Medical Encyclopedia. *MedlinePlus*. Retrieved February 24, 2022 from <https://medlineplus.gov/ency/patientinstructions/000814.htm>
- [105] Four things you can do to support your teen’s mental health. *unicef*. Retrieved February 24, 2022 from <https://www.unicef.org/parenting/health/four-things-you-can-do-support-your-teens-mental-health>
- [106] Student Stress 101: Understanding Academic Stress | JED. *The Jed Foundation*. Retrieved February 16, 2022 from <https://jedfoundation.org/resource/understanding-academic-stress/>