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In their words: Connecting on-line weblogs to developmental processes

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This paper seeks to connect adolescents' communication within on-line weblogs or blogs to developmental processes. A total of 195 English language blogs written by self-identified 14- to 18-year-olds were selected; three entries from each blog were analysed, resulting in a sample of 585 entries. Blogger demographics, self-presentation, and blog entries (format, style, content, and tone) were coded. The blog authors in our sample were overwhelmingly female and lived within the US; the majority were between 15- and 16-years of age. Bloggers utilized usernames and userpictures for self-presentation and in addition to gender, frequently presented information about their age and location. The majority of the entries used text, were narrative and reflective in style, and contained themes related to their authors' peers and everyday life. Emotional tone was present and entries with romantic, identity, and future-related themes often contained emotional tone. Blog authors seemed to be using blogs to create narratives and to reflect about the people and events in their lives. Our results show that adolescent bloggers project off-line themes to their blogs, suggesting that their on-line and off-line contexts are psychologically connected.

At the forefront of the movement towards user-generated media/content are weblogs or blogs, which are 'frequently modified web pages containing dated entries listed in reverse chronological sequence' (Herring, Kouper, Scheidt, & Wright, 2004). There are now over 70 million weblogs in the blogosphere; worldwide about 120,000 new weblogs are being created everyday and 1.5 million entries are being made per day (Technorati Blog, 2007). Blogs are popular among youth, and compared to adults, adolescents report being more likely to write a blog as well as to read blogs (Lenhart & Madden, 2005). For instance, 19% or 4 million on-line youth between 12 and 17 years have created their own blogs and 38% or 8 million on-line youth read blogs. Like e-mail

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and instant messaging that came before and social networking sites (e.g. MySpace) and video/photo sharing sites (e.g. YouTube) that came after; blogs are on-line forums that are used by young people for communication (Subrahmanyam & Greenfield, 2008a). Yet, we know very little about how adolescents' on-line communication relates to their development. Is their on-line communication connected to core developmental processes? What purposes might such communication serve? Are adolescents' on-line worlds connected to their off-line ones? These are some of the questions that our paper addresses in the context of blogs.

A theoretical framework for understanding adolescents' on-line communication

To understand the role of electronic communication in adolescent development, we start with the proposal that in interactive Internet contexts, such as chat rooms, users are co-constructing their on-line environments (Subrahmanyam, Šmahel, & Greenfield, 2006). Since users are co-constructing their on-line environments, we suggest that phenomenological (or off-line) and virtual (or on-line) worlds are likely to be psychologically connected. Online worlds may thus serve as a playing ground in which to explore important developmental preoccupations from the off-line world. For adolescents, these would include tasks such as formulating identity, adjusting to sexuality, and establishing intimate relations with peers and romantic partners (Brown, 2004; Erikson, 1959; Hill, 1983; Weinstein & Rosen, 1991), issues that we address next.

Adolescent developmental processes

Although developmental challenges such as sexuality and identity are present throughout the life-cycle, they take on a special role during adolescence (Steinberg, 2008, p. 13). A major challenge facing adolescents is adjusting to their developing sexuality, in particular their increased sexual drive and interest in sex (Weinstein & Rosen, 1991). For many young people today, sexual activity begins during adolescence (Mosher, Chandra, & Jones, 2005; Savin-Williams & Diamond, 2004) and the rate of sexual activity increases with age (Cubbin, Santelli, Brindis, & Braveman, 2005). Research suggests that when making decisions about sexual behaviour, adolescents turn to their peers for support and peer communication appears to be their main source of information about sex, followed by the media (Ward, 2004). These efforts are part of the larger task facing adolescents - constructing their sexual selves. Consequently sexual exploration, finding a romantic partner, and engaging in a romantic relationship take on importance during adolescence (Buzwell & Rosenthal, 1996). Sexual experiences and romantic relationships are also a source of stress for adolescents; for instance, Wilson-Shockley (1995) found that real and fantasized sexual/romantic relationships are the single most common cause of adolescents' strong emotions, both positive and negative. Emotions more generally are an important aspect of adolescence, and adolescents are more emotional than both pre-adolescents (Larson & Lampman-Petratis, 1989) and older adults such as their parents (Larson & Richards, 1994).

Another equally important developmental issue during adolescence is the construction of a psychosocial identity, which may be best viewed as coherent sense of self (Erikson, 1959, 1968), one in which an individual is comfortable with who he or she is and also knows where he/she is headed. The biological changes that occur during this period challenge the adolescent to find his or her ego identity, which includes both a

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'conscious sense of individual uniqueness as well as an unconscious striving for continuity of experience' (Kroger, 2003, p. 206). For Erikson, the issues of vocational decision-making, ideological values, and sexual identity were the bases of ego identity. Identity exploration and commitment are important to identity formation and adolescents' reflections about themselves, their characteristics, and social position helps them construct their identity (Nurmi, 2004). According to McAdams (1999), individuals who are on the threshold of adulthood construct narratives or dynamic internal life stories about themselves as a means of creating a coherent sense of who they are. These identity narratives draw from the adolescents' past, present, and hoped-for future and contain themes related to agency (or achievement and mastery) and communion (or interrelations to others). Developmental research suggests that although identity exploration may take place throughout adolescence, it is not until late adolescence and emerging adulthood that a coherent sense of the self is typically established (Nurmi, 2004; Reis & Youniss, 2004; Waterman, 1999). In other words, identity as a developmental task may be more important to older rather than younger adolescents.

A third major adolescent issue is that of developing intimate relationships with peers and then romantic partners, individuals who are becoming increasingly important in the lives of adolescents (Furman, Brown, & Feiring, 1999). Over the course of adolescence, peers become more prominent in young peoples' lives, as they develop autonomy and exert independence and distance from their families (Brown, 2004; Ryan, 2001). Research has documented adolescents' need for close friends (Pombeni, Kierchler, & Palmonari, 1990) and their desire for emotional fulfilment, intimacy, and companionship from friends and romantic partners (Connolly, Furman, & Konarksi, 2000; Larson & Richards, 1991). In fact, it is during adolescence that young people develop the ability to have truly intimate relationships, ones that are based on openness, honesty, and self-disclosure (Brown, 2004). Research suggests that during early and middle adolescence, self-disclosure to friends increase; the trend towards greater disclosure to friends over parents starts in early adolescence for girls and middle adolescence for boys (Buhrmester & Prager, 1995). According to Buhrmester and Prager (1995) such self-disclosure plays an important role in development and is a means by which young people are able to obtain the social input/provisions that help them deal with the issues that concern them at any given point.

Research suggests that adolescents turn to peers and media to help them deal with the developmental challenges that they face. Establishing intimacy with peers is not only a developmental issue in its own right, but it also helps adolescents deal the tasks that they face such as construction of their sexuality and identity. For adolescents, peers are an important source of information about sex (Kallen, Stephenson, & Doughty, 1983; Ward, 2004). Other popular topics in adolescent peer conversations include appearance (Giblin, 2004) and the self (Johnson & Aries, 1983), issues important to identity construction. In addition to peers, adolescents use mass media such as television and magazines for information about sex (Borzekowski & Rickert, 2001; Brown, Childers, & Waszak, 1990; Ward, 2004) as well as aspects of identity, such as gender and sexual identity (Arnett, 1995; Brown *et al.*, 1990; Ward, 2004). Subrahmanyam, Greenfield, and Tynes (2004) have argued that because newer forms of on-line communication such as chat rooms combine peer interaction with a popular medium they may provide a promising venue for adolescents to explore the developmental challenges they face in their lives.

Co-constructing developmental processes in on-line communication: Are on-line and off-line worlds psychologically connected?

There is mounting evidence that adolescents do indeed co-construct their off-line developmental concerns in their on-line communication forums. Qualitative analysis of an extensive conversation from an on-line teen chat room (Subrahmanyam *et al.*, 2004) suggested that participants were using their chat codes in the service of important developmental issues such as identity, sexuality, and interpersonal connection. This qualitative analysis was confirmed by a series of quantitative studies based on a large sample of teen chat room conversations containing 12,000 utterances and 1,100 participants (Smahel & Subrahmanyam, 2007; Subrahmanyam *et al.*, 2006). These studies revealed that identity presentation (Subrahmanyam *et al.*, 2006), partner selection (Smahel & Subrahmanyam, 2007), and sexual comments (Subrahmanyam *et al.*, 2006) were the most frequent kinds of utterances in chat rooms. Sexuality, identity, and intimate relations are also three of the most pressing developmental tasks facing adolescents today (Brown, 2004; Brown, Feiring, & Furman, 1999; Collins, 2003; Hill, 1983; Nurmi, 2004; Savin-Williams & Diamond, 2004). The findings that users are co-constructing important developmental processes in on-line environments suggest that off-line and on-line worlds may be psychologically connected and there is increasing empirical support for this proposal.

For instance, teens have been found to use instant messaging mainly to communicate with off-line friends about things that happened in school, gossip, and the like (Gross, Juvonen, & Gable, 2002). In the Pew survey on social networking, teens, particularly girls, reported using these sites to keep in contact with their peers from their off-line lives to either make plans with friends that they see often or to keep in touch with friends who they see rarely (Lenhart & Madden, 2007). The girls in this study also reported using social networking sites more to reinforce pre-existing friendships whereas boys reported using them to flirt and make new friends. Finally, in a study of 67 blogs written by self-identified teenagers, Huffaker and Calvert (2005) reported that half the blogs contained references to sexual identity and love relationships, boyfriends/girlfriends, and crushes. These authors concluded that teenagers' blog explorations involved issues similar to the explorations typical of the adolescent years. Again and again, we see that on-line communication forms are being used in the service of adolescent developmental processes such as peer relations, sexual exploration, and partner selection.

Further evidence for the connectedness of the two worlds comes from research on on-line pretense and identity play. A recent review of the literature concluded that although youth do pretend to be someone else on-line, it was not very frequent, and when they do pretend, it was usually to be older (Subrahmanyam & Greenfield, 2008a). In other words, adolescents' on-line faces seem closer to their reality, suggesting again that off-line and on-line worlds may be psychologically connected. Although youth may not be using on-line contexts to experiment with different roles and identities in the manner envisioned by Erikson (1959) and Turkle (1995), there is evidence that they use these contexts to practice self-disclosure and self-presentation, which are important for the construction of a coherent identity. For instance, in the study of 12,000 chat utterances described earlier, identity declarations comprised 12% of utterances and were made by 55% of chat users (Subrahmanyam *et al.*, 2006). Similarly a content analysis of web pages created by adolescents with cancer found that Internet elements such as welcome pages, diary entries, and personal history pages were used for cancer-related self-expression (Suzuki & Beale, 2006).

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Interestingly, although users are projecting off-line concerns such as identity presentation on to on-line contexts, we are seeing some transformations along the way. For instance, in off-line contexts, an important means for expressing identity is the body (Merriwether, 2004). However in on-line environments, participants are disembodied and depending on the context may be more or less anonymous. Prior research has found that users are adapting to these challenges as well as are taking advantage of the medium's opportunities such as its multimodal capabilities (Herring, 2000; Subrahmanyam *et al.*, 2004). For instance, the study on chat rooms found that in anonymous and disembodied chat rooms, adolescent users adopted gendered and sexualized nicknames for self-presentation (Subrahmanyam *et al.*, 2006). Similarly in the analysis of web pages created by teens with cancer, there seemed to be a shift towards more graphical representations of teen identity using pictures and images. Thus although adolescents may be transferring off-line developmental concerns on to on-line contexts, the representation of those concerns may be transformed at times, while at other times they may be intensified or remain unchanged.

Viewing the virtual world as continuous with the real world allows us to begin to understand on-line behaviour and its relation to adolescent development. At the same time, the Internet is very diverse and different on-line contexts afford different opportunities and limitations (Subrahmanyam *et al.*, 2006). To begin to develop a coherent understanding of virtual socialization, researchers need to conduct in-depth studies of different on-line environments. This paper focuses on one such on-line context, adolescents' blogs, the topic that we address next.

Adolescent blogs

Even though blogs are popular among adolescents, there has been little systematic research on their use by this age group. Herring *et al.* (2004) analysed random samples of 203 blogs in March 2003 and 154 blogs in September 2003. They found that among the teen authors, there were more females than males, whereas among the adult authors there were more males than females. With regard to blog type, they found that personal journal type blogs (content internal to the blogger such as his/her thoughts) were mostly maintained by teen females and filter blogs (content external to the bloggers such as links to world events or other sites) were mostly maintained by adult males. Interestingly, 71% of the total sample consisted of personal journal type blogs. Herring, Scheidt, Bonus, and Wright (2005) have pointed out that on-line blogs have off-line antecedents; for instance, personal journal blogs have many elements from hand-written diaries. Unlike traditional diaries, however, blogs may be public and allow readers to post comments about a particular entry.

The study of adolescent blogs by Huffaker and Calvert (2005) described earlier examined gender similarities and differences in the blogs ($N = 67$) written by teen authors between 13 and 17 years of age. Both male and female authors revealed information about themselves such as their names, ages, and location in their blogs and their blogs seemed more like an 'extension of the real world, rather than a place where people like to pretend' (Huffaker & Calvert, 2005). Males used more emoticons than females, and their language was more resolute and sure; however there were no gender differences in the extent to which aggressive or forceful language and passive or compliant language was used. These results suggest some shifting of gender roles within on-line contexts and show that although off-line behaviours are played out on-line, they make take on different forms and intensities. Analysing the

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same data, Huffaker (2006) reported that content analysis of a random sample of teen blogs revealed that blog narratives include topics from everyday life such as school, grades, college, as well as more intimate topics such as romantic relationships or sexual identity.

Although Huffaker's work (Huffaker, 2006; Huffaker & Calvert, 2005) provides preliminary evidence that traditional adolescent concerns are played out in on-line blogs, the content analysis focused only on four themes – schoolwork and grades, romantic relationships, homosexual identity, and discussion of music lyrics (Huffaker, 2006). There remains much we do not know about adolescent blogging – for instance, who these adolescent bloggers are, how they present themselves in this new on-line forum, what they write about, the purposes these blogs may serve, and whether adolescents' on-line blogs are connected to their off-line lives. Equally important, the findings about adolescent blogs to date are based on a relatively small number of blogs – the study reported by Huffaker and Calvert (2005) was based on 67 blogs and the Huffaker (2006) study does not provide details about the sample such as the number of blogs and gender of authors. Clearly we need to analyse a larger number of entries to better understand adolescent blogging to shed light on the virtual socialization that occurs in on-line teen blogs and to address theoretical questions surrounding the connectedness of off-line and on-line lives.

The present study

The present study seeks to develop a better understanding of adolescent blogging and the adolescent blogosphere. Some of the questions we will address are: Who are these adolescent bloggers and how do they present themselves in on-line blogs? How do they use common blog elements such as words/text for self-presentation and self-disclosure? What do adolescent bloggers write about and what does the content of their blogs tell us more generally about the relationship between their on-line and off-line worlds? What purposes may these blogs serve for their adolescent authors – do teens use blogs as a sounding board to reflect about their thoughts and feelings, as a forum for feedback and validation from their peers, or as a means to construct narratives about themselves, their days, and their lives? At a deeper level, analysing a snapshot of the teen blogosphere will speak to questions about the psychological connectedness between adolescents' on-line communication and off-line developmental processes.

To address these goals, we collected and analysed on-line blogs written by authors who self-identified as adolescents. Blogs were collected from nine different on-line hosting sites. Search terms such as 'teens', 'adolescents', and 'high school students' were used to identify blogs written by adolescents. Because on-line phenomena, such as blogs, often operate like a fad, we only included active blogs written by experienced bloggers rather than neophytes. We analysed blogger profiles as well as three entries from each blogger. Blogger profiles were examined to identify the blog authors' self-declared age, gender, and location. Bloggers' usernames and userpictures were examined and the format (e.g. use of visuals, audio, and text) of their entries was analysed to reveal adolescent bloggers' self-presentation and self-disclosure in on-line contexts. The thematic content of blog entries was analysed to identify the topics that adolescents' blog about and the affective tone of their entries in order to determine the connectedness between their on-line and off-line worlds. Finally, to determine the purposes that blogging may serve for adolescents, we analysed entry styles (e.g. whether

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entries were narrative, reflective, or contained quizzes and surveys) and also identified the extent of feedback/comments that entries received.

We expected that there would be more female than male blog authors. Two reasons led to this expectation. Firstly, Herring *et al.* (2004) reported that among teenage authors, there were more females than males. Secondly, the most commonly found blogs, the personal journal type, are similar to handwritten diaries (Herring *et al.*, 2005); anecdotal observations of adolescents suggest that in the off-line world today, teen girls are more likely to keep diaries or personal journals than teen boys. With regard to blogger self-presentation, prior research on chat rooms (Subrahmanyam *et al.*, 2006) led us to expect that blog authors' would take advantage of blog elements such as usernames and userpictures to present information about themselves such as their gender, appearance, and interests.

Given that self-disclosure to peers increases during adolescence (Buhrmester & Prager, 1995) and that blogs provide adolescents with a means for peer communication, we expected that adolescent bloggers would use their blog entries as a vehicle for self-disclosure about themselves; because of the multimodal formatting and stylistic elements of blogs, we expected that authors would capitalize on the visual and textual capabilities to transform their self-presentation and self-disclosure. Based on our thesis that on-line and off-line worlds are psychologically connected, we predicted that the blog authors would self-disclose about important adolescent concerns such as sexuality, identity, peers, and romantic relationships. Considering these adolescent concerns from a developmental perspective we expected entries written by self-identified older bloggers to contain more references to romantic relationships/sexuality and identity and expected older adolescents to refer more often to peers than younger ones, and younger adolescents to refer more often to families compared to older adolescents (Cubbin *et al.*, 2005; Furman *et al.*, 1999; Nurmi, 2004; Reis & Youniss, 2004; Ryan, 2001; Waterman, 1999).

As adolescents are more emotional than both pre-adolescents (Larson & Lampman-Petratis, 1989) and older adults such as their parents (Larson & Richards, 1994) we expected that emotional tone would be strongly present in their blog entries. Furthermore, we expected entries written by younger bloggers to contain stronger emotional tone, since emotional highs and lows occur more often in early adolescence (Rosenblum & Lewis, 2003). Given that a significant portion of adolescents' strong emotions are related to sexual/romantic relationships, we expected that entries dealing with romantic/sexual issues to be stronger in emotional tone than entries containing themes such as family and school (Wilson-Shockley, 1995). Finally, we predicted that adolescents keep blogs for social validation and feedback from their peers (Buhrmester & Prager, 1995) as well as to construct narratives about themselves (McAdams, 1999).

Method

Sample

The blog sample consisted of a total of 201 weblogs collected from 9 hosting sites. The hosting sites were identified from a Google search of blog hosting sites that was conducted in October 2005. We selected sites that were used by adolescents and that allowed us to search for blogs using terms such as age, high school, and teens to ensure that our sample contained blogs written by adolescents. From each blog, the last three

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entries created between April 15, 2005 and May 15, 2005 were collected, yielding a total sample of 603 entries.

Four criteria were used to select the blogs for our sample. Firstly, the blog authors had to be adolescents in high school, roughly between 14 and 18 years of age. Secondly, the blog entries had to be written in English. Thirdly, we only included blogs that had been created before the end of January 2005. This was done to ensure that we analysed blogs that were written by adolescents who had been blogging for at least a couple of months prior to the sampled period. Finally, we only sampled blogs that had a minimum of five entries during the specified 4 week period from April 15 to May 15, 2005. The latter two criteria were applied to ensure that only active blogs were sampled and that the blog authors had been blogging consistently during this time period. This is important because, once created, many blogs are not actively maintained and we wanted to ensure that we only analysed the blogs written by regular bloggers rather than by neophytes. The final breakdown of the blogs from the nine hosting sites was: Xanga ($N = 34$); LiveJournal ($N = 34$); Blog-City ($N = 28$); Blog Drive ($N = 33$); Journal Space ($N = 7$); blogsearchengine.com ($N = 5$); Blurty ($N = 14$); DeadJournal ($N = 13$); and Open Diary ($N = 33$).

Procedure

The blog sample was constructed by two researchers using a multi-step process. For each site, the research assistant started by searching for blogs written by adolescents in high school between 14 and 18 years of age; search terms depended on the particular hosting site and included words such as age, teenagers, and high school students. When there was any ambiguity regarding the age of the blogger, the entire blog was searched for explicit confirmation that the author was an adolescent; for instance, we looked for information about high school events such as proms, dances, musicals, and high school exams. Of the blogs that were retrieved from this initial search, we eliminated any blog that was not in English.

Next, to identify blogs that had been created before the end of January 2005, we checked the date when that particular blog was created. Most hosting sites provided this information either on the blog's main page or by following a link to the author's user information page. For a few sites that did not provide this information, we had to manually backtrack on the archival calendar that was common to all hosting sites. We only included blogs that either had a creation date on or before January 31, 2005 or had any entries prior to that date. Finally to retrieve blogs whose authors had five posted entries between April 15, 2005 and May 15, 2005, we again checked the archival calendar feature to see if there were at least five entries during this period. Because the calendars were not always accurate, we manually checked the archive list to make sure there were at least five entries.

Blogs that met all of the criteria as described above were included in our sample and those that did not meet our criteria were eliminated until we reached our target; although our initial goal was to have an approximately equal number of blogs from each of the nine hosting sites, we found that some hosting sites consistently yielded more blogs that fit our criteria and the distribution of our final sample reflects this as well. Each researcher retrieved approximately half the blogs from each hosting site. Because of the fluid and changing nature of the Internet, we saved the blogs off-line as HTML files to ensure access to the blogs throughout the study. For each blog, the last three entries posted between April 15 and May 15 were saved.

Coding

The coding system was developed using a bottom-up procedure similar to the grounded theory approach of Strauss and Corbin (1990). Early on, it became apparent to us that blogs are very complex in nature as they allow a variety of elements (such as text and visuals, narratives and quizzes) as well as a variety of ideas and themes. Thus not only do blog entries differ widely from each other, but a given entry can contain a diverse set of elements and themes. We started by having all authors read through a pilot sample of 20 blog entries line-by-line. The pilot sample of blogs was obtained from the same hosting sites as the blog corpus analysed in the study. Next each author independently developed a list of blog elements and content ideas/themes that recurred throughout the sample blogs. Then we compared the individual lists to identify the most common elements and themes, and guided by our research questions, narrowed our focus to blogger demographics and self-presentation as well as the format and content of the entries themselves. For each of these aspects, coding categories were developed keeping in mind our hypotheses as well as what we found in the pilot blogs themselves. For instance, for content, we identified the coding categories of family, peers, romance, and identity based on their presence in the blogs and our interest in adolescent developmental processes. In addition, we found other themes that recurred and so included categories such as the structured aspects of everyday events and problem behaviours (e.g. drugs and alcohol). Next operational definitions were developed for the categories; to test the operational definitions, coders first coded several blog profiles/entries together and then did so on their own. When there were disagreements between the coders, we discussed ways to revise and improve the operational definition for that category. Further rounds of practice coding with the revised operational definitions were carried out for such problematic coding categories using another set of entries from our pilot sample data. This process continued until it appeared that the coders agreed about the meanings of the definitions. Two of the authors worked on the coding of blogger demographics and self-presentation and two authors worked on the coding of the blog entries.

To assess inter-rater reliability, both coders coded 10% of the sample (201 blogs and 603 entries); therefore 20 blogs were coded to establish reliability for blogger demographics and self-presentation and 60 entries were coded to establish reliability for coding the format and content of blog entries. Inter-rater reliability was established by calculating the kappa coefficient; acceptable levels were obtained on the first round for all but two of the coding categories (Blog-Related Issues and Opinion Disapproval). After further discussion and changes to the operational definitions, a second round of formal reliability coding for these two categories using more blogs from our sample data yielded acceptable levels of reliability. The final kappa coefficients for all categories ranged from 0.77 to 1.00. Each coder then coded half of the remaining sample of blog profiles and entries; disagreements in the reliability sample were resolved by discussion between the coders and the first author and the resolution was included in the final data set that was analysed.

Blogger demographics and self-presentation

For blogger demographics, we coded the following variables from the information in the profile page as well as from blog entries: age (as of May 15, 2005); gender (from explicit statements as well as cues such as personal pictures, profile information, references in entries, colour schemes, and layouts); location (US or outside the US); and duration of

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blogging (length of time that the blog had been maintained as of May 31, 2005). A blogger's self-presentation was assessed by coding each blog author's username and userpicture. A username is the blog author's self-selected on-line name (e.g. *NewPrinceRoll*, *SilverGirl*) and is designated by the account name; usernames were coded as gendered (masculine and feminine), activities, or other (see Table 1 for coding categories, definitions, and examples). Note that all usernames reported in this paper are pseudonyms, created by us along lines of those that we found in our sample. A userpicture is a blog author's self-representation in the form of a two-dimensional icon. It is found in a prominent position on a blog's main page as well as next to a username, allowing for easy identification, such as when a poster makes or responds to a comment. Userpictures were coded for both format and content (see Table 1 for coding categories and definitions). We also coded whether or not a blogger provided his/her contact information such as an e-mail address, instant message screen name, or a link to another website (e.g. personal web pages, photo galleries, MySpace profile, etc.).

Table 1. Coding categories and examples for usernames and userpictures

Category	Description and example (if relevant)
Username	Masculine (e.g. <i>NewPrinceRoll</i> , <i>Sillyowen</i>), if it contained (1) male names (e.g. <i>Eric</i>), (2) terms used to refer to males (e.g. <i>boy</i> , <i>dude</i>), (3) words with masculine connotations (e.g. <i>jock</i> , <i>stud</i>) Feminine (e.g. <i>Shannon919</i> , <i>SilverGirl</i>), if it contained (1) female names (e.g. <i>Emily</i> , <i>Lauren</i>), (2) terms used to refer to females (e.g. <i>babe</i> , <i>miss</i>), (3) words with feminine connotations (e.g. <i>angel</i> , <i>babe</i> , <i>pink</i> , and suffixes such as <i>-lious</i> , <i>-ie</i>) Activities (e.g. <i>Origami_Rules</i> , <i>Soccergirl</i>), if it contained explicit references to sports, hobbies, or other activities Other (<i>Busy_Libel</i> , <i>StageLightsBelow09</i>), if it did not fall into any of the above categories
Userpicture format	Text, if it contained only textual elements such as quotes, sayings, phrases, single words Visual, if it featured a photo or graphic prominently Text and visual, if it featured both a photo/graphic and text
Userpicture content	Pop culture, if it featured easily recognizable elements from pop culture, such as musicians, actors, video game characters, animated characters, brand name logos Self-photo, if it featured a photograph of the blogger (for e.g. if it matched the photo in the User profile, other photos in the blog, was a year book photo, etc.) Other, if it featured a photo or graphic that could not be categorized as being either pop culture-based or a self-photo such as photos or drawings of objects

Blog entries

Because of the complexity in user-generated media such as blogs, we coded blog entries for their format, style, content, and tone. In addition, we also coded the number of comments that each entry received. The format of blog entries was coded as follows: (1) Text, if words were used; (2) Audio, if the entry included audio media in formats such as wav, midi, mp3, or external links; (3) Visual, if the entry included visual media such as pictures/photographs, emoticons, symbolic fonts, animations, and video; and (4) Hyperlinks, if an entry included at least one hyperlink that a reader could click on and be redirected to another Internet site. Note that entries could be coded as containing more than one formatting element.

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The writing style of blog entries was coded as follows: (1) Narrative, if an entry contained a sequential description of event(s) or details of event(s) within larger event(s) (e.g. 'Tim came over. After we went to pennys, got me some shorts, and walmart. it was good. Really good. We didnt stick around very long . . . went to hastings, dairy queen, and then the park . . .'); (2) Reflective, if the author analysed people, ideas, situations, and events via a train of thought (e.g. 'Things are getting better. I dunno how I'm gonna talk to someone about something. Its awkward and its gonna be hard . . . But anyway. I have a lot to think about. Its nice being on good terms with certain other people though'); (3) Filter, if it primarily consisted of content that was external to the blogger, such as another Internet site; (4) Feedback/Response, if an entry specifically asked for feedback, a response, suggestions, or information (e.g. 'my parents are being retarded about prom night and I, um, have a 12:30 curfew? thats right. so anyone who wants to give me some advice as to how to weasel out of that one, I would greatly appreciate it.');

(5) Creative, if an entry included song lyrics, poetry, jokes, quotes, artistic photography, music, or drawings that may or may not have been created by the author (e.g. 'I know you won't be missin' me, but I'll be missin' you . . . And so this is the quote of mind for the past few days'); and (6) Quizzes and Surveys, if an entry contained a quiz, survey, or both. Note that entries could be coded as containing more than one style element.

The content of entries were coded as follows (see Table 2 for examples): (1) Family, if it included a discussion of family members, including siblings, parents, pets, or extended family (i.e. aunts, uncles, cousins, god-parents, nephews, and grandparents) of the author or another individual that the author is writing about; (2) Peers, if an entry included a discussion of the author's peers (including friends, confidants, or acquaintances) but not including the author's romantic interests. The entry could also include issues related to peers such as cliques or popularity; (3) Romantic relationships and sexuality, if an entry included a discussion of romantic relationships or indicated a concern with romance. Again, the relationships could either be the author's or that of another individual, reciprocal or one-sided, or from the past, present, or pertaining to the future; (4) Identity if an entry included a discussion of self-image, self-concept, self-description, self-esteem, body image/appearance, or concerns related to the religious, ethnic, sexual identity of the author; (5) Structured life, if an entry referred to the structured life of the author or of another individual which could be from the past, in the present, pertaining to the future. This included school (such as academic issues, classes, school dances, attendance of school sporting games, or teachers), extracurricular activities (such as band, choir, driver's education, piano lessons, summer camp, or tae kwon do), and part-time work. Academic issues (such as classes, grades, or test scores) were also included if not explicitly mentioned in respect to college; (6) Teen problem behaviours, if an entry included a discussion of drugs, drinking, shoplifting, abuse, eating disorders, or abnormal/unhealthy behaviour as related to teens; (7) Life events/issues, if an entry included the discussion of past, present, and future events/issues that do not fall in the above five categories. Examples include health issues not related to sex (such as ulcers, strep throat, or the flu) and salient life-events (such as all issues dealing with braces, driver's licenses, car crashes, birthdays, or holidays); (8) Public scene, an entry that included a discussion of pop culture, news, politics, or weather. Pop culture included music, celebrities, video games, modern electronics, movies, books, or any other topic that the general public knows about; (9) Future, if an entry included a discussion of long-term plans. For the adolescents in our sample, this was usually about college (school topics that are explicitly stated in respect to college),

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careers, dreams, future vocations, or anxieties about the future. (We specifically did not include summer vacation plans or exaggerated statements such as ‘when I rule the world, no one will listen to country music.’); and (10), Blog Related Issues, if an entry revealed the author’s conscious awareness of the audience/reader such as if the author specifically asked for comments or feedback, discussed entries (e.g. layout features) or commented on the act of blogging. As before, an entry could be coded as containing more than one content element.

Table 2. Examples of blog topics/themes

Topic/Theme	Example
Family	My mom went to her lawyer and shit yesterday. Things went well I guess. Then she ran into his ex-wife and told her everything that really happened and whats going on. Its unreal
Peers	ah. . .tonight was so freeking crazy fun:). . .jazz band and dairy queen afterwards with THE BOYS (mike randy jeff and tom). . .it was soo. . .interesting lol. . .guys are just so funny
Romantic relationships/sexuality	and I got laid so I am happy. Its great that sex is a universal language! j/k. No but I am really starting to care about him. I don’t know why because everyone says he is ugly. I don’t think so. . .
Identity	I am soft spoken and I am strong, but I won’t stand up for myself very often. I am naive and come off snobby a lot of the time. But when it all comes down to it, inside me there is this evil fairy who takes over at times and destructs my life
Structured life	Math – sucks. Teacher did not do his job all week. Today, he rushed us into learning this difficult topic in minutes and snapped every time someone asks him to explain. Ugh!
Teen problem behaviours	But yeah, we showed up an hour and a half late and my group left early so I rode home with the sophomore attendants. Not to mention my ride was drinking anyway and it made me incredibly nervous
Life events/issues	dentist. Got rubberbands for my braces. Suck
Public scene	My teacher assigned me to be a Senator–Senator Gordon Smith of Oregon, a Republican. Well, seems like he’s not all that Republican, definitely has an independent streak and willing to cross party lines, which is cool
Future	I am worrying about my future. I am afraid I wont earn enough. . . everyday, I key into the comp people’s monthly income and I see alot of \$700–\$1,200, the occasional \$1,500. and when I see \$2,000, I say, that’s quite a lot. When I see \$3,000, I go wow
Blog-related issues	If your reading this. COMMENT BITCHES. I don’t know who still reads this without looking at my aim profile anymore

The tone of entries was also coded if the blog author explicitly stated an emotion or if he/she conveyed strong approval or disapproval of a subject. Tone was coded into the following categories: (1) Happiness (e.g. ‘I’m leaving on a jet plane . . . haha . . . well I’m leaving for DC tonight! I’m sooo excited!!!:):’); (2) Sadness (e.g. ‘it’s a good things im not wearing makeup./my face would be strewn with sadness. Black and dirty . . .’); (3) Anger/frustration (‘wow THATS annoying. I had a tennis game today, but we were watching schindler’s list . . . the bus left at two and I missed it’); (4) Love (‘Your MY beautiful, MY angel, MY baby, MY EVERYTHING! I know how fragile you are. . . . Beth,

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your heart is more precious to me than anything. I promise to never break it, to never break you. I love you so much. . . '); (5) Approval ('I'm reading Please don't Kill the Freshman for the 100,000 time. or maybe not. it's a really good book'); and (6) Disapproval ('I think myspace is probably THE dumbest thing ever. You post incredibly bad pictures of yourself so you can be e-friend with your real friends that you see everyday'). Lastly, we coded the number of comments that each entry received.

Results

The blog corpus was analysed at two levels - at the level of the teen blogosphere and at the level of the individual blogger. At the level of the blogosphere, the unit of analysis was each entry, regardless of who the author was and the analysis was based on the total number of entries in our corpus. Such an analysis is informative about the kinds of entries that are posted and that blog audiences read about. At the individual level, the unit of analysis was each blogger and we coded whether or not a blogger had used/incorporated a particular kind of blog element at least once; regardless of whether the blog author used that element, once, twice, or thrice, he/she was considered to have used that element and contributed only one data point for the analysis. Such an analysis is useful to determine age-related differences in adolescent blogging.

Blog author demographics and self-presentation

As described earlier, our goal was to only analyse blogs whose authors were in high school and or reported being between 14- and 18-year-olds. Of the blogs that were included in our sample, further examination revealed that six were not in our targeted age range - there were two 13-year-olds, three 19-year-olds, and one 20-year-old. These authors and their entries were not included in any of the analysis reported henceforth and all results are based on a final sample of 195 blogs and 585 entries.

In our final sample of 195 blog authors, the mean self-declared age of the authors was 15.73 years with an *SD* of 1.09 years; age could not be determined unambiguously for 49 of our blog authors. Among the 75% of the participants whose age could be determined ($N = 146$), there was a reliable difference in the age distribution [$\chi^2(4, N = 146) = 39.7, p < .01$]; 14% were 14-years-old ($N = 20$), 29% were 15-years-old ($N = 42$), 35% were 16-years-old ($N = 51$), 16% were 17-years-old ($N = 24$), and 6% were 18-years-old ($N = 9$). Thus the majority (64%) of the bloggers in our sample self declared themselves to be between 15- and 16-years of age. The adolescent bloggers in our corpus were overwhelmingly female (87%); only 5% of the bloggers were male, and we were not able to unambiguously code gender for 8% of our sample [$\chi^2(2, N = 195) = 250.09, p < .01$]. The bloggers in our sample reported living in different parts of the world, including the US ($N = 109$), Canada ($N = 10$), Australia ($N = 7$), the UK ($N = 5$), and Singapore ($N = 4$), as well as Brunei, Indonesia, Malaysia, and New Zealand (there was one blogger from each of these countries); 30% of the bloggers did not provide information about their location.

Blog authors' on-line self-presentation was assessed by coding their usernames and userpictures. Coding of usernames revealed that 35% were feminine, 4% were masculine, 2% referred to activities, and the remaining 59% could not be unambiguously coded. We also assessed concordance between bloggers' stated gender and their gender identity presented in their usernames. Fisher's exact test confirmed that there was

consistency between bloggers' stated gender and their gendered identity presented in their usernames ($p < .01$). None of the authors who revealed that they were males were coded as having feminine usernames and only 2% (or 3 authors) who revealed that they were female were coded as having masculine usernames.

Userpictures are optional and 60% of the blog authors had one. However, there was a reliable age effect in the tendency to have a userpicture [$\chi^2(1, N = 195) = 47.5, p < .01$] and younger bloggers (14-, 15-, and 16-year olds) were more likely to have a userpicture than older bloggers (see Figure 1). A chi-square analysis to test for age effects (14-, 15-, 16-, 17-, and 18-years) on the format of the userpictures (visual, textual, and visual & textual) yielded no reliable effect ($p > .05$). It appears that a majority of the userpictures were visual (71% were visual, 26% visual and textual, and 3% were textual). There were also no age differences in the content of the userpictures ($p > .05$), with a self-photograph being the most popular (47%), followed by other (35%) and pop culture (18%), [$\chi^2(2, N = 117) = 14.97, p > .01$].

The adolescent blogosphere

To provide the reader some context for the qualitative analysis of blog content, we start with three observations about the blog entries in our sample. Firstly, the entries were extremely complex as well as diverse in terms of format, topic, and the frequency with which they were updated. Secondly, many of the bloggers seemed to be aware that they had an audience and would obliquely refer to 'stuff' as they called it. Phrases such as 'they know who they are', 'I'm not going to say who', or 'something that pissed me off so much' were common, suggesting that select readers could understand what they wrote about without further elaboration. A third feature of blogs was the authors' use of on-line language, involving creative spelling and abbreviations. Again, there was a lot of variation in the extent to which individual bloggers used this, but one example of an entry illustrating such language is thus: 'Aniwae went back to hq fer life support attachment tdy. . . . Tot we wld end early but *ala* We actually ended 2hrs or more ltr. . .'. Careful reading of the entry coupled with knowledge of on-line language and conventions revealed this to be 'Anyway, went back to hq for life support attachment today. Thought we would end early, but *sigh* we actually ended two or

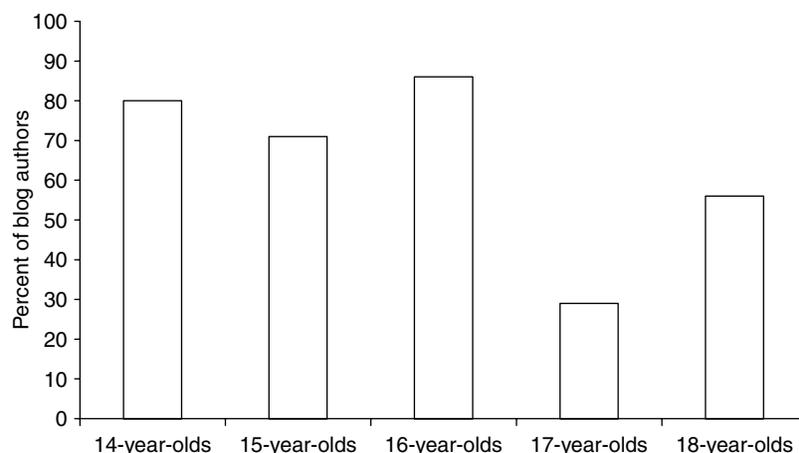


Figure 1. Percentage of blog authors who adopted a userpicture as a function of age.

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more hours later'. Although we were able to decipher most of the sentence, the word 'hq' still had many possible interpretations. Together these features raised many challenges when coding the blog entries, but doing so provided a snapshot of the adolescent blogosphere.

With regard to blog format, an overwhelming majority of our entries (579 out 585) contained text. Visual elements (32%) were the next most common followed by hypertext (12%), and audio files (3%). With regard to entry style, narrative (60%) and reflective (49%) entries were the most common in our blog corpus. However, only the trend towards narrative entries was reliable [$\chi^2(1, 585) = 24.21, p < .01$]. Much less common were the other blog entry styles, including filter (6%), feedback/response (8%), creative (14.2%), and quizzes/surveys (7%). Interestingly, most of the 32 entries that were coded as using the filter style linked to media as opposed to websites promoting social causes.

Content analysis of the 585 blog entries revealed that peers and structured life were the most popular topics followed by family, public scene, blog-related issues, and romantic relationships/sexuality; the least frequent themes were life-events, identity, teen problem behaviours, and future (see Figure 2). Interestingly, only 5% of the entries dealt with teen problem behaviours and not a single entry explicitly promoted risky behaviours such as drinking alcohol or using drugs. To the contrary, one blogger wrote, 'I still maintain that you can have a perfectly fun time without alcohol. Yehhhh'.

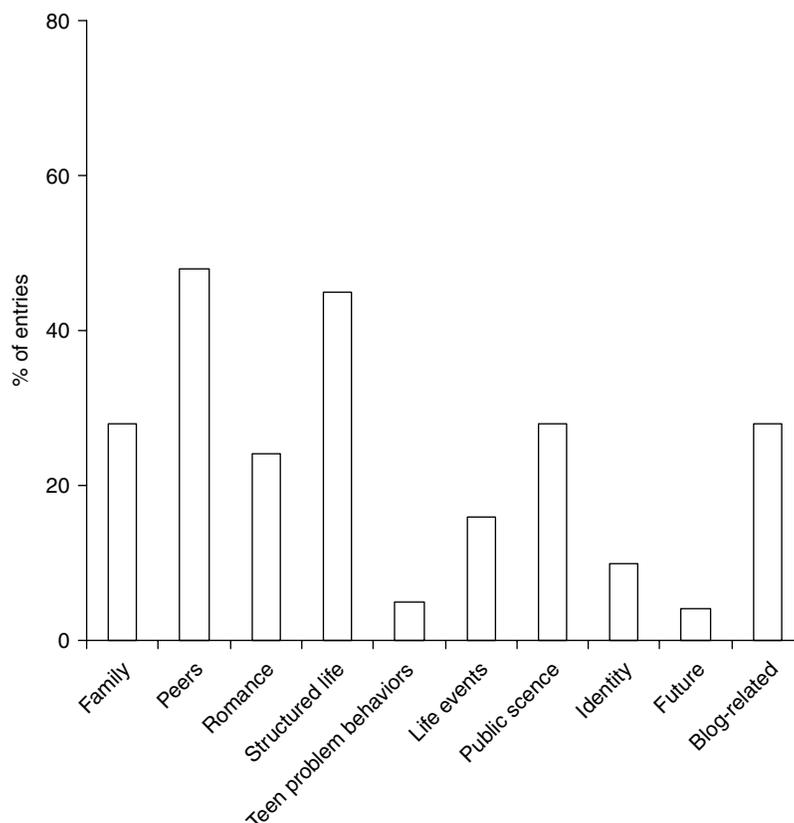


Figure 2. Distribution of topics/themes in the teen blogosphere.

As predicted, emotional tone was present and 29% of the entries contained explicit and strong emotions. Of the entries that did contain strong emotions ($N = 167$), anger and frustration was the most common (40%), followed by happiness (29%), sadness (25%), and love (14%). Figure 3 shows the percentage of entries with emotional tone as a function of the themes they contained. In line with our expectations, 47% of entries with romantic content contained strong emotional tone. Interestingly, two other themes that were sources of emotional angst for the authors in our sample included identity (45%) and the future (46%). Opinion, particularly approval, was in 45% of entries and disapproval in 34% of entries. The number of comments that each entry received varied widely and ranged from 0 to 47. The majority of the entries in our sample received no comments (52%); 38% received between 1 and 4 comments, 6% received between 5 and 8 comments, and 3% received between 9 and 12 comments. A little less than 1% of the entries received more than 20 comments.

Individual differences in blogging

To assess individual differences in blogging, we conducted separate chi-square analyses to see whether there were age differences (14-, 15-, 16-, 17-, and 18 years) in the adolescent bloggers' use of blog formatting and stylistic elements (e.g. text, visuals) and content themes (e.g. family, peers). Only bloggers whose age could be determined were included in this analysis ($N = 146$). For format, there were no reliable age effects in the

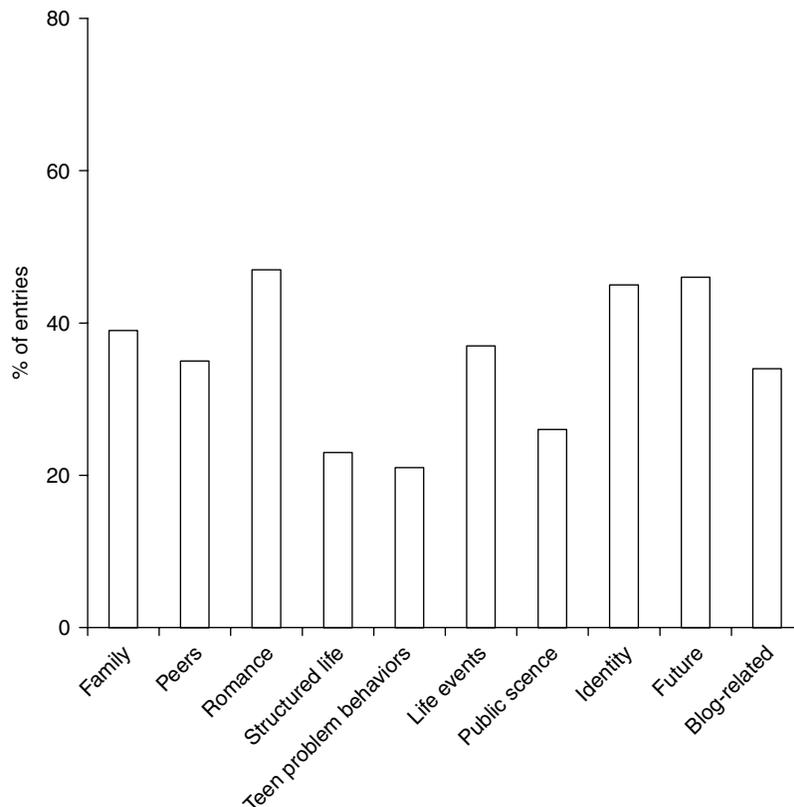


Figure 3. Percentage of entries with emotional tone as a function of the theme/s they contained.

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tendency of blog authors to use text, audio and hypertext (all p 's ranged from .36 to .07); although not reliable, age differences in the tendency to use visual elements approached significance [$\chi^2(4, 146) = 8.53, p = .07$]. Figure 4 shows that a smaller percentage of the oldest authors (17- and 18-year-olds) used visual elements compared to the authors in the other age groups. There were no age differences in authors' use of the different blog styles of narrative, reflective, filter, creative, and quiz-style entries (all p 's ranged from .39 to .87). The frequency of narrative entries ranged from 86 to 95% for the different age groups. For reflective entries, the frequency ranged from 75 to 89% for the different age groups. These were also the two most frequently found entry styles in our sample.

Chi-square analyses on the tendency of blog authors to incorporate different themes in their blog entries revealed no reliable age differences - p 's ranged from .87 to .07. Table 3 shows the percentage of bloggers in the different age groups who wrote at least one entry containing the themes that were analysed in our corpus. Although not reliable, the tendency to write family oriented entries approached significance [$\chi^2(4, 146) = 8.50, p = .07$]; 71% of 17-year-olds and 70% of 14-year-olds wrote at least one entry including the topic of family, whereas between 41 and 59% of 15-, 16-, and 18-year-olds did so. In contrast, very similar percentages of bloggers from the different age groups wrote at least one entry involving the topic of peers (between 79 to 88%) and structured life (between 71 to 85%). Another trend worth noting concerns romantic relationships - a smaller though not reliable percentage of 14-year-olds (25%) wrote at least one entry addressing this theme compared to the oldest bloggers (56%).

There were also no reliable age differences in the frequency with emotional tone was used in blog entries [$\chi^2(4, 146) = 2.52, p > .05$]. However, examination of the distribution suggests a tendency for the youngest bloggers to use emotional tone most frequently - 70% of 14-year-olds incorporated strong emotional tone at least once in their entries, whereas only 50-60% of 15- to 18-year-olds did so.

Discussion

We undertook this study to develop a better understanding of adolescent bloggers, their blog entries, and the virtual socialization that occurs within the teen blogosphere.

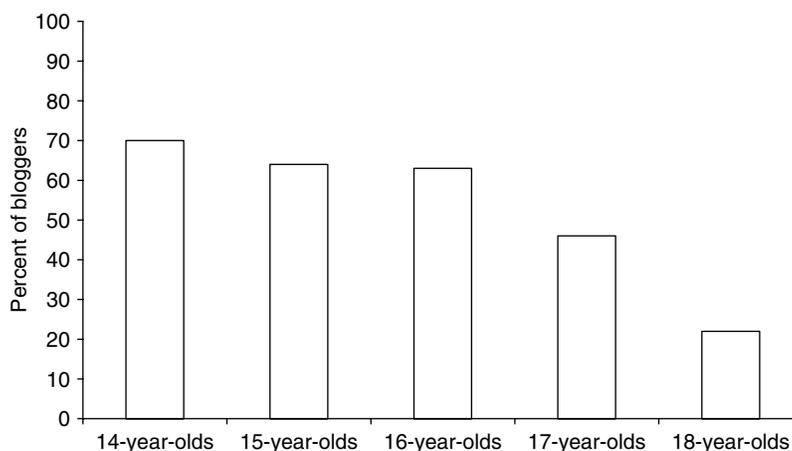


Figure 4. Percentage of blog authors who used visual elements as a function of age.

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Table 3. Percentage of bloggers who used the different themes in their entries

Topic/Theme	14-year-olds	15-year-olds	16-year-olds	17-year-olds	18-year-olds
Family	70	41	59	71	44
Peers	85	88	82	79	78
Romantic-relationships/sexuality	25	45	37	42	56
Structured life	85	74	71	71	78
Teen problem behaviours	5	12	12	13	0
Life events/issues	30	21	43	46	11
Public scene	65	48	61	50	56
Identity	35	31	18	21	33
Future	15	2	12	4	11
Blog-related issues	50	55	53	46	22

Three sets of questions motivated our study: Who are these adolescent bloggers and how do they present themselves in their blogs? What do adolescents blog about and why do they blog? What do adolescents' blogs tell us about the psychological connectedness between their off-line and on-line worlds?

Blogger demographics and self-presentation

To get a better sense of which adolescents are more likely to blog, we analysed blogger demographics. Based on blog authors' self-declared age, it appeared that the majority of the bloggers in our sample were in middle adolescence. Like other on-line communication forms, blogging is reported to be a global phenomenon and a number of countries were represented in our sample. However, it should be noted that the majority of the bloggers in our sample reported that they lived in the United States, followed by Western countries such as Canada, Australia, and the UK. This was very likely because we sampled from English language blogs, as well blogs on US based hosting sites. Future research should study the similarities and differences in blogs hosted in different countries/regions in order to better understand how adolescents from different cultural contexts construct and use their on-line blogs. There is some preliminary evidence in this regard - compared to English language blogs, Czech blogs are mostly composed of visuals, particularly photographs of music stars, suggesting that Czech adolescents may strongly use media for self-presentation in this on-line context (Blinka, Smahel, & Subrahmanyam, 2008).

Interestingly, the blog authors in our sample were overwhelmingly female. We had predicted that there would be more female bloggers than males, but had not expected this large a gap. Such a big difference in the numbers of male and female bloggers was also in contrast to prior work on blogs (e.g. Herring, 2004). However, it should be noted that the presence of a gender bias is fairly typical of young people's adoption and use of digital media such as computers and the Internet. Most prior findings of a gender gap, however, have been in the opposite direction, with boys reporting greater access and use. In the early years of digital technology, computer applications were largely a male pastime. Although the gender gap in computer use has narrowed somewhat with the advent of the Internet (Subrahmanyam, Greenfield, Kraut, & Gross, 2001), some applications, such as off-line (Durkin & Barber, 2002) and on-line computer games (Griffiths, Davies, & Chappell, 2004) remain more popular among adolescent males.

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Our finding of a gender bias among blog authors is actually a rare example of a digital domain clearly dominated by adolescent females. Given the popularity of personal journal-style blogs among this age group, it may be that females have gravitated towards blogs because they afford them the opportunity to 'talk' about their everyday life. This finding is consistent with prior research that has found that in both traditional play as well as computer game play, girls prefer familiar settings and real-life themes whereas boys prefer more aggressive and fantasy-based themes (Subrahmanyam & Greenfield, 1998). Similar processes may account for the male preference for gaming and the female preference for blogging in adolescents' on-line worlds.

Blogger self-presentation was assessed by coding usernames and userpictures. Prior research has shown that within an anonymous and disembodied context such as an on-line chat room, where identity information may not be readily available, self-presentation via gendered nicknames and identity declarations is frequent (Subrahmanyam *et al.*, 2006) and 46% of chat participants used gendered nicknames. In the present study, 40% of the blog authors adopted usernames that were gendered and there was consistency between bloggers' self-declared gender and their gendered nicknames. These results suggest that usernames are one tool that blog authors use for self-presentation, and one kind of information about themselves that they frequently present is their gender. Age is another important piece of information about the self, and 75% of the sample provided that information. Interestingly, we know from a classic study in social psychology (Brewer & Lui, 1989) that age and sex are the primary categories to which people are assigned to and are readily apparent in face-to-face encounters. Our results suggest that these are also the kinds of information about themselves that blog authors readily present in their blogs.

A third piece of self-information in on-line contexts is location (Subrahmanyam *et al.*, 2004), and that information was provided by 70% of the blog authors. Our findings are consistent with Huffaker and Calvert's (2005) and show that blog authors utilize usernames and age and location placeholders to provide basic identity information about themselves. Thus it appears that contrary to early speculation about the Internet (e.g. Byam, 1995; Turkle, 1995), adolescent bloggers do provide important identity information about themselves and do not choose to be completely anonymous. Interestingly, we were not able to unambiguously code nearly 60% of usernames and future research should connect bloggers to their usernames to determine the other kinds of self-information that adolescents choose to present via their on-line usernames.

Another tool for self-presentation that the blog authors had at their disposal was userpictures, and a majority of the bloggers had one. Interestingly younger bloggers were more likely to have one compared to older bloggers. There may be two possible reasons for this - firstly it may be that self-presentation is more important to younger adolescents; because public displays of the self may drive one's sense of self (Baumeister, 1986), younger adolescents might have also been more likely to adopt userpictures as part of their efforts to present themselves. A second possibility is that younger Internet users might be more technologically able and more at the forefront of trends such as adopting and creating userpictures (see Greenfield & Subrahmanyam, 2003). But a majority of the userpictures were visual and there were no age differences with regard to the tendency to use visual versus textual userpictures. At the same time there was a tendency for younger bloggers to use visual elements more often in their blog entries compared to older bloggers. Thus it may be that we are seeing a shift towards the use of visual images for self-presentation and the youngest on-line users may

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be at the forefront of this trend. Prior research on the topic of usernames/nicknames has been on text-based environments (Subrahmanyam *et al.*, 2006) and more research is necessary to clarify the development of self-presentation among young people in the newer multimodal on-line contexts.

As stated earlier, a majority of userpictures contained visual images, and self-photographs were the most popular kind. Although the Internet is often been touted as a place where one can leave one's body behind (Kendall, 2003; Stallabrass, 1995; Wakeford, 1999), it does seem that adolescent bloggers are doing just the opposite, and are instead capitalizing on the visual nature of the medium (e.g. self-photographs as userpictures) or finding creative ways (e.g. gendered nicknames) to take their bodies with them to their on-line haunts. We found no developmental differences in the tendency to use self-photos versus other kinds of images. Furthermore, a little less than 20% of the blog authors in our sample used images from popular culture for their userpictures, showing that young people are using such images for their self-presentation. Although it is not a new trend for young people to use media images and references for identity construction, it is worth noting that blogs and other newer forms of user-generated media make it very easy for users to adopt images from popular culture. Thus it may be that as the technology gets easier to use, we will see an intensification of the phenomena of using media and popular culture in the service of self-presentation.

One final point - almost 60% of usernames and 35% of userpictures could not be unambiguously coded for their content. These latter representations were not accessible to us given that we had no contact with the bloggers. While it is possible that they were meaningful to the bloggers' peers and known others, they might have also only been meaningful to the authors themselves. It is very likely that usernames and userpictures are used by bloggers and other on-line users both to present themselves to others and to construct personally meaningful representations of the self. Future research should explore this question by connecting on-line users to their on-line usernames/identities.

Describing the adolescent blogosphere: The what and why of adolescent blogging?

Our results reveal a snapshot of the adolescent blogosphere as consisting mostly of text-based entries with some visuals that only rarely contained hypertext and audio files. A majority of the entries were narrative and reflective in style, and focused on everyday themes such as the authors' peers and the structured life of their adolescent authors. Emotions when present in the entries consisted of approving/disapproving opinions as well as anger/frustration, suggesting that blogs may be an avenue for young people to express their thoughts, feelings, and frustrations.

Individual analysis suggested that whereas bloggers of all ages were equally likely to use text, younger adolescent bloggers were more likely to use visual elements than older adolescents. The tendency for younger bloggers to use more visual elements may be indicative of a shifting preference for visual representation. Subrahmanyam and Greenfield (2008b) have proposed that because users internalize symbol systems utilized by media, the popularity of visual media forms such as television and the Internet may be slowly shifting representational styles from verbal to visual; because younger people tend to be earlier adopters of technology, they may be at the forefront of such a change. The finding that the youngest bloggers in our study used more visual elements than older bloggers may be illustrative of just such a shift.

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Our finding that narrative and reflective entries were the most common is in line with prior research (Herring *et al.*, 2004). Such entries are usually found in journal-type blogs suggesting that the majority of the blogs in our study were also personal journal-type blogs; in fact, our sample contained only a very small number of filter-style entries (with content external to the author such as links to world events or other sites) and few entries contained hypertext. As pointed out by Herring *et al.*, it is somewhat ironic that media and scholars have focused more on filter-style blogs, even though personal journal type blogs are most popular among adolescent females, who along with older males, are the two groups that most commonly maintain blogs (Herring *et al.*, 2004).

Content analysis revealed that blogs are very rich in content and that most entries consisted of multiple topics. The most common topics were peers, everyday life happenings, and family. Less commonly found were adolescent concerns such as identity, romance and sexuality, and problem behaviours. In contrast, research has revealed the presence of psychosocial concerns such as identity, sexuality, and romantic relationships (Subrahmanyam *et al.*, 2006) in another on-line context, Internet chat rooms. Internet chat rooms generally afford greater anonymity than blogs; furthermore, at the height of their popularity, the Internet was not diffused as extensively as it is now, and so one was less likely to meet friends and known others within them (Kraut *et al.*, 2002; Subrahmanyam & Greenfield, 2008b). In contrast, in recent years, one is more likely to interact on-line with known others and anonymity has become harder to achieve. Perhaps concerns about anonymity led blog authors to not reveal intimate details about themselves, but instead led them to write about topics that were less intimate, but nonetheless important to them. From oblique references and phrases such as 'they know who they are', it seemed that the blog authors in our sample were aware that they had an audience and this may have influenced what they wrote. Anecdotal observations and focus groups suggest that for many blog authors, a majority of their 'friends'/audience are people from their off-line world. However, there is no empirical research on this topic and future research on adolescents' on-line behaviour should try to connect individual adolescents and their on-line communication (e.g. blog entries, facebook posts, etc.) in order to get a deeper understanding of the role of electronic communication in adolescent life.

Contrary to our predictions, we did not find systematic age trends in the presence of adolescent themes such as peers, family, identity, sexuality, or problem behaviours. In fact except for peers, which was written about equally often by the different age groups, most of these concerns were not even that frequent in our entries. However, consistent with one of our developmental hypotheses, there was a trend for a greater percentage of older bloggers to write about romantic relationships. Blog authors wrote mostly about their day, and often reflected on life, music, and their blog itself, or used their entries to vent their emotions or express their opinions. Emotions play an important part in adolescents' lives, and we had predicted that they would be an integral aspect of their on-line entries as well. The most commonly found emotions were anger and frustration, happiness, and sadness, in decreasing order. Romantic relationships are a source of stress and strong emotions in adolescents' lives (Wilson-Shockley, 1995) and as expected, entries with romantic themes were similarly tinged with emotional tone. In addition, entries that dealt with identity and the bloggers' future also contained strong emotional tone, showing the link between off-line concerns and on-line behaviour.

In addition to describing the adolescent blogosphere an important goal of this study was developing an understanding of why adolescents may blog. To answer this question, we analysed several aspects of adolescent blogs - entry style and content, as

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well as the comments/feedback that entries had received. We had speculated that adolescents maintain blogs for peer feedback and validation as well as to construct self-narratives. Contrary to our prediction, feedback to blog entries was generally very sparse and the majority of entries received no feedback and only few entries received a large number of comments. Despite the general lack of feedback, the bloggers in our sample appeared to have persisted with blogging, at least until the time that we had collected our sample. Thus it does not seem as though the adolescent bloggers were motivated by the prospect of feedback and validation. Instead it appears that the adolescent bloggers were using their entries to create narratives about the people and events in their life as well as to reflect on them. Indeed, a majority of the entries were narrative and reflective in style and contained themes related to peers and the structured aspects of everyday life. In addition, emotional tone was prominent - suggesting that blogs may also serve as a means for adolescents to express their strong emotions and feelings of anger and frustration about the people and events in their life. According to McAdams (1999) such narratives or life stories help individuals on the brink of adulthood to construct a coherent sense of the self. We suggest that although the authors in our sample did not often write explicitly about identity, the narratives they were constructing in their blogs nonetheless may have helped them with the task of establishing their sense of self.

Are off-line and on-line worlds psychologically connected?

Developmental research on young people's off-line lives has revealed that self disclosure to peers increases during adolescence (Buhrmester & Prager, 1995). Our analysis of blogs reveals that such disclosure about themselves similarly occurs in an on-line adolescent haunt. Note also that the majority of the bloggers were in middle adolescence. Adolescent bloggers frequently wrote about their everyday life happenings, their peers, and their family. In addition, they often wrote about public events, such as in popular culture or politics. Peers and family are a big part of adolescents' off-line worlds (Hill, 1983) as are everyday happenings and the public scene, suggesting that adolescent bloggers do project issues from their off-line world on to their blog entries. We also saw parallels between adolescents' off-line lives and their on-line writing with regard to their expression of emotional tone. For instance, romantic relationships are a major source of emotional stress for adolescents and entries that dealt with the theme of romance also contained emotional tone.

Also relevant is our finding that an overwhelming majority of the blog authors in our sample were female. Most of the blogs were personal journal-type blogs. Although there is evidence that there are gender differences in activities and interests as early as the second year of life (e.g. DiPietro, 1981; Zarbatany, Hartmann, & Rankin, 1990), there is no empirical evidence on the question of gender differences in the keeping of hand-written diaries (but see, Gannett, 1992). However, within popular culture today, diary writing is generally considered to be a female rather than a male activity (Gannett, 1992, p. 100); consider, for instance, that diaries and journals are generally marketed to females and not males. A related finding is that there are gender differences in autobiographical memories, and women produce longer and more detailed accounts of past events than men; interestingly, these gender differences emerge quite early in development (Reese, Haden, & Fivush, 1996). There is also evidence that towards the end of high school, females perform better than males on both reading and writing (National Center for Education Statistics, 1997). Blogs involve reading and writing and the recounting of

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past events (particularly in personal journal-type blogs); from the prior research just reviewed (National Center for Education Statistics, 1997; Reese *et al.*, 1996) we know that these are activities that females are good at. It seems that there are similarities in what adolescents like to do on-line and off, and gender preferences in the off-line world are mirrored in the on-line world. Thus it appears that adolescents bring their off-line lives with them to their on-line blogs and are not leaving them behind. This finding provides support for our thesis that adolescents' off-line and on-line worlds are psychologically connected and that on-line contexts are used as a screen to play out off-line concerns and issues.

Although there is connectedness between on-line and off-line worlds, they are certainly not mirror images of each other. For instance, an important developmental concern such as identity was not explicitly brought up in adolescents' on-line blogs very often. At the same, bloggers' often produced narratives about their lives and their peers and such narratives may help to establish a sense of self. Thus connectedness does not mean that issues and concerns are expressed in an identical manner in both contexts - instead it means that concerns from the off-line world are addressed but in a manner adapted to the opportunities and limitations presented by the on-line medium. Additional support for the connectedness of on-line and off-line worlds as well as for the role of the medium comes from blog authors' self-presentation. Many of the teen bloggers used gendered nicknames and self-photographs to share information about themselves such as their gender; such information is not readily available in on-line environments and show that on-line users adopt medium-specific tools (e.g. nicknames, userpictures) to connect their off-line and on-line selves. Gendered nicknames and the explicit sharing of identity information such as age, sex, and location have previously been found in chat rooms, a disembodied text-based on-line context (Subrahmanyam *et al.*, 2006). Further evidence that transformations might occur in the expression of off-line concerns comes from our finding that romance/sexuality was a relatively infrequent theme in the blog entries. This is in contrast to the typical expression of sexuality and sexually related themes in adolescents' off-line lives (Ward, 2004; Weinstein & Rosen, 1991) as well to their intensified expression in anonymous teen chat rooms (Subrahmanyam *et al.*, 2006). We see here that the affordance of an on-line context, in this case its lack of anonymity, may have transformed the manner in which an off-line concern was expressed.

Conclusions and future directions

In conclusion, as on-line communication forms are popular among adolescents, it is becoming important to understand their roles in adolescent life. Analysis of blog authors and their entries show that there are many similarities between the physical and the virtual when it comes to adolescent bloggers' self-presentation and the content of the entries. The results of this study provide evidence that for young people, on-line and off-line contexts are psychologically connected and adolescent users may be projecting off-line themes on to their on-line worlds. At the same time, however, the expression of off-line concerns is influenced by the particular opportunities (e.g. anonymity) or challenges (e.g. disembodied environment) presented by the on-line medium. It is also important to bear in mind that extant research on the connectedness between on-line and off-line behaviour has analysed adolescents' on-line communication in isolation (e.g. chat conversations, blog entries) and has not connected this

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discourse to the actual individuals who created them. As more on-line communication forms become private, it will also become increasingly difficult for researchers to conduct the kind of studies that were heretofore possible. Future research should start with adolescent users and then attempt to connect their on-line and off-line worlds and also identify the factors that influence the extent of connectedness or divergence between the two worlds.

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