Access and Completion of a Web-based Treatment in a Population-Based Sample of Tornado-Affected Adolescents

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Although Web-based treatments have significant potential to assess and treat difficult-to-reach populations, such as trauma-exposed adolescents, the extent that such treatments are accessed and used is unclear. The present study evaluated the proportion of adolescents who accessed and completed a Web-based treatment for postdisaster mental health symptoms. Correlates of access and completion were examined. A sample of 2,000 adolescents living in tornado-affected communities was assessed via structured telephone interview and invited to a Web-based treatment. The modular treatment addressed symptoms of posttraumatic stress disorder, depression, and alcohol and tobacco use. Participants were randomized to experimental or control conditions after accessing the site. Overall access for the intervention was 35.8%. Module completion for those who accessed ranged from 52.8% to 85.6%. Adolescents with parents who used the Internet to obtain health-related information were more likely to access the treatment. Adolescent males were less likely to access the treatment. Future work is needed to identify strategies to further increase the reach of Web-based treatments to provide clinical services in a postdisaster context.

Keywords: adolescents, Internet interventions, traumatic stress, natural disaster

Adolescents exposed to natural disasters are at high risk for posttraumatic stress disorder (PTSD; Garrison et al., 1995; La Greca, Silverman, Vernberg, & Prinstein, 1996), depression (Kar & Bastia, 2006; Warheit, Zimmerman, Khoury, Vega, & Gil, 1996), use of tobacco (Parslow & Jorm, 2006) and alcohol products (Reijneveld, Crone, Verhulst, & Verloove-Vanhorick, 2003; Rohrbach, Grana, Vernberg, Sussman, & Sun, 2009). The ability of organized care settings to render treatment to adolescents with such diagnoses is impaired after a natural disaster, however (Self-Brown, Anderson, Edwards, & McGill, 2013). In a postdisaster environment, most agencies are focused on the basic and imme-

diate needs of those affected. As a result, potentially long-term needs, such as psychological issues, are not well addressed. Such challenges are especially problematic in rural and nonurban locations because there are typically fewer available resources (Norris, 2002; West, Price, Gros, & Ruggiero, 2013). Adolescents with postdisaster mental health difficulties are unlikely to be identified and receive treatment as a result.

Alternative modalities of service delivery, such as the Internet, have significant potential to address the mental health needs of adolescents, especially those in nonurban and rural areas. There are several strengths to Web-based treatments. Nearly all (95%) American adolescents use the Internet, and many use it to obtain health information (Madden, Lenhart, Duggan, Cortesi, & Gasser, 2013). Web-based treatments can be delivered at no cost to the end user beyond fees associated with Internet access. In the immediate aftermath, most disaster relief focuses on restoring basic services to the affected community, including electricity and Internet access. Therefore, it is likely that most households will have access to the Internet in the period shortly after a disaster. Web-based treatments are effective at treating posttrauma symptoms, although the majority of research has focused on adults (Amstadter, Broman-Fulks, Zinzow, Ruggiero, & Cercone, 2009). Provision of Web-based treatments from local or national service agencies after a disaster may improve the quality of care offered and reduces the burden placed on individual care organizations.

Despite the proposed benefits, the reach of Web-based treatment to disaster-affected adolescents in urban and rural areas is unknown. *Reach* is defined as the extent to which a given population

will engage with and complete an available intervention (Koepsell, Zatzick, & Rivara, 2011). Applied to the current problem, not all adolescents who are given access will engage in and benefit from a postdisaster Web-based treatment. Prior work with Web-based treatments with adolescents for depression and anxiety reported completion rates from 30% to 62% (Calear, Christensen, Mackinnon, Griffiths, & O'Kearney, 2009; O'Kearney, Gibson, Christensen, & Griffiths, 2006; O'Kearney, Kang, Christensen, & Griffiths, 2009). A study with disaster-affected adults reported that 52% of a population-based sample accessed a multicomponent Web-based treatment, and 27% completed at least one component (Price, Gros, McCauley, Gros, & Ruggiero, 2012). Understanding rates of access and completion, and the variables associated with each of these behaviors is therefore a critical step toward informing service agencies about the reach of Web-based treatments (Klopper, Schweinle, Ractliffe, & Elhai, 2014).

The behavioral model of health services use offers a framework with which to identify factors associated with access and completion of Web-based treatments (Andersen, 2008). The model posits that variables associated with use of services fall into three domains. The first domain, predisposing factors, includes the social environment, demographic information, and cultural perspectives. The second, enabling factors, includes the availability of resources to the individual and the financial means to obtain health care. The third, evaluative need, is an individual's need for health services on the basis of objective criteria regarding his or her general health, functioning, and symptom severity.

Prior work with adolescents identified the predisposing factors of gender and environment in which the intervention was delivered as most relevant to the completion of a Web-based treatment (Neil, Batterham, Christensen, Bennett, & Griffiths, 2009). A second study determined that the predisposing factors (more education, younger age) and enabling factors (having used the Internet to obtain health information) were associated with an increased likelihood of access of a Web-based intervention among disaster affected adults (Price et al., 2012). This study also found that the predisposing factor of prior use of mental health treatment was most relevant to completion. Interestingly, perceived need was largely unrelated to access and completion in both samples, which calls into the question the role of symptoms in motivating individuals to seek Web-based care.

For agencies to appropriately implement and disseminate Web-based treatments with adolescents in a postdisaster context, additional research is needed to understand the factors associated with access and completion. Disaster-affected adolescents may be less likely to utilize Web-based treatments because of disruptions in roles, routines, and relationships and the competing demands after a disaster (e.g., addressing basic needs associated with property damage, physical health, and displacement). Second, few studies have examined predictors of accessing treatment, because of the complicated methodology required to answer such questions. A population must first be identified and data collected before the treatment is available. All participants are then given access, yet only a subset will take advantage of the treatment. The majority of prior work either made the treatment available to the general public or targeted a specific population. Studies open to the general public are unable to describe the overall sample size or specific characteristics of the participants who were aware of but chose not to access the treatment. Alternatively, studies that use a targeted population, such as in a school setting, offer participants dedicated time and encouragement. The latter approach is likely to overestimate the proportion of the sample that accessed the intervention.

The present study sought to determine the proportion of adolescents, located in nonurban and urban areas affected by tornados, who accessed and completed a Web-based treatment. Adolescents were first assessed via the telephone for potential predictors and then invited to access the Web site in a naturalistic setting (e.g., their homes). On the basis of previous literature with disaster-exposed adults (Price, Davidson, Andrews, & Ruggiero, 2013; Price et al., 2012), it was estimated that 40% of the sample would access the Web site. Consistent with the behavioral model of health services use, it was hypothesized that predisposing factors and enabling factors would be most relevant to access. Specifically, the predisposing factors of female gender and the enabling factor of regularly using the Internet to access health-related information would predict access and completion. Perceived need factors—including symptoms of PTSD, depression, tobacco use, and alcohol use—were also explored given their theoretical relevance.

Method

A population-based sample of disaster-affected adolescents was recruited. Address-based sampling was used to recruit 2,000 adolescents from Alabama and Missouri. Specific regions were targeted using the coordinates of areas exposed to a series of tornados that occurred 4 months prior the start of recruitment. Census block IDs were assigned to the radii around each coordinate (e.g., 0.5 miles, two miles) to serve as sampling strata. Households were recruited by phone or via mail. Exclusion criteria included residence in an institutional setting, households with neither a landline telephone nor a cellphone, lack of home Internet access, lack of children ages 12–17 years, and being non-English speakers. Budget restrictions precluded translating the intervention into other languages. The overall cooperation rate, calculated according to the American Association for Public Opinion Research industry standards (i.e., [number screened] divided by [number screened + screen-outs + unknown eligibility]), was 61%. After a complete description of the study was provided, verbal informed consent was obtained from parents and adolescents over the phone.

Households with multiple eligible adolescents had one selected at random. After the baseline interview, families were given access to the Web site via a unique login account. Adolescents were randomized to the intervention or a control condition after they accessed the Web site. Randomization occurred in a 3:1 (experimental:control) allocation. Families were compensated $25 for their participation. Adolescents were contacted via telephone 4 months after their baseline interview to obtain additional feedback.

Participants

The sample contained 2,000 adolescents (M_{age} = 14.5 years, SD = 1.7). The gender distribution of the sample was nearly equal (boys: n = 981 [49.0%]; girls: n = 1,019 [51.0%]). Self-reported race was as follows: White: n = 1,251 (62.5%); Black: n = 451 (22.6%); other: n = 75 (3.8%); and declined to answer: n = 223 (11.1%). Fifty-four participants (2.7%) reported Hispanic ethnicity. Most households had partnered parents (n = 1,469 [73.4%]).

Median annual income was between $40,000 and $60,000; 1.422 (71.1%) of the parents reported some college education. One-third of the sample reported living in a rural area (33.9%), 61.4% reported living in an urban area, and 4.5% reported living an urban cluster according to U.S. census information based on zip code.

Measures

A structured baseline interview was administered to the adolescent and a designated parent to assess demographics, disaster impact, and postdisaster mental health functioning. Highly trained interview staff using computer-assisted telephone interviewing (CATI) conducted the phone interviews. CATI maximized the efficiency of the interview process by allowing for specific skip patterns and reducing missing data.

Disaster exposure. The operationalization of disaster exposure was based on an interview used in prior research (Acierno et al., 2007). Disaster exposure was measured with nine binary items that assessed whether the participant was physically present for the tornado or injured by the tornado. Additional questions asked if the tornado caused the participant to be concerned about others, displaced from their home, or to lose a pet. Lack of access to electricity, water, clean clothing, and food for at least 1 week was also assessed.

Mental health. Parent mental health was assessed with the Kessler 6 (K6), a brief self-report survey assessing depression and anxiety (Cairney, Veldhuizen, Wade, Kurdyak, & Streiner, 2007; Kessler et al., 2002). Internal consistency for the K6 in the present study was good ($\alpha = .86$). Adolescent mental health was assessed with a structured interview that was validated in prior epidemiologic studies with national samples (Kilpatrick & Acierno, 2003; Resnick, Kilpatrick, Dansky, Saunders, & Best, 1993). The interview yielded dichotomous outcomes indicating whether the participant met criteria for PTSD since the tornado, met criteria for depression since the tornado, had ever used alcohol, and had ever smoked cigarettes.

Internet use for health. Internet use for obtaining health-related information among parents was assessed with the question "Have you ever looked on the Internet for information about a specific disease or medical problem?" Adolescents were asked separately if they had ever looked online for information about physical health, mental health, cigarettes, or substance use.

Intervention. The intervention, called *Bounce Back Now*, was modular such that participants accessed the content modules on the basis of their preference. Adolescents could enter up to four separate modules that offered strategies to reduce symptoms of PTSD, depression, cigarette use, and alcohol use. After entering a module, adolescents were administered a screener that assessed the symptoms targeted by the module. For example, the depression module asked about the symptoms of depression. Participants who endorsed two symptoms of depression, three symptoms of PTSD, or any tobacco use were identified as a screen-in and encouraged to complete the respective module. Participants with a negative screen were given the option to complete or leave the module. All participants were given the alcohol module regardless of screener results.

Content for each module was consistent with evidence-based treatments for the respective conditions. The PTSD module provided psychoeducation and guidelines on how to complete thera-peutic exposures to trauma-related stimuli, reduce avoidance, and develop coping strategies to manage anxiety (Deblinger et al., 1990; Pynoos, 1993; Ruggiero et al., 2001). The mood module featured behavioral activation strategies, which have shown promise as easily understood and efficacious in the treatment of depression (Hopko, Lejuez, Ruggiero, et al., 2003; Jacobson et al., 1996; Ruggiero et al., 2007). The tobacco and alcohol modules used brief motivational-enhancement and cognitive–behavioral strategies (Dennis et al., 2004; Waldron & Kaminer, 2004). These strategies are evidence based and were intended to address the needs of adolescent populations, such as teaching skills to (a) refuse substance abuse offers from peers; (b) establish a positive family and peer network that is supportive of abstention from use; (c) develop a plan for positive, enjoyable activities to replace substance use–related activities; and (d) cope with stressful and/or high-risk situations (Sampl & Kadden, 2001). Content was displayed through various media to enhance engagement with the intervention (e.g., text, graphics, animations, videos, quizzes).

Control condition content included questions to assess knowledge of a given disorder without providing intervention components or feedback. Control participants did not receive the interactive components (e.g., graphics, videos, activities within the module) or educational materials that were part of the experimental condition. As a result, the control condition was considerably less time-consuming for participants.

Definitions of access and completion. Participants who started a module were considered to have *accessed* the module. Participants who then reached the last page of a module were considered to have *completed* the module (Eysenbach, 2005).

Data Analytic Plan

An overall rate of access was calculated by dividing the number of adolescents who accessed at least one module by the total number of participants. Module-specific access rates were calculated by dividing the number of participants who accessed a given module by the total number of participants. Rates of completion were calculated by dividing the number of adolescents who completed the module by the total number of participants who accessed the module. Generalized estimating equations were used to identify predictors of access and completion (Zeger, Liang, & Albert, 1988) using nested models (Singer & Willett, 2003). An initial model containing all hypothesized predictors was first fitted. Retention of predictors was evaluated in a systematic fashion through change in the deviance statistic. Variables within a category (demographics, Internet access, disaster variables, parent mental health, and adolescent mental health) were removed from smallest to largest odds ratio (OR). Separate models were evaluated for each module.

Results

Rates of Access and Completion

The proportions of the sample that accessed and completed the intervention are indicated in Figure 1. Invitations to access the Web site were sent to 2,000 adolescents. More than one in three adolescents chose to access the Web site ($n = 717$ [35.8%]). Of those who accessed the Web site, 550 were randomized to the
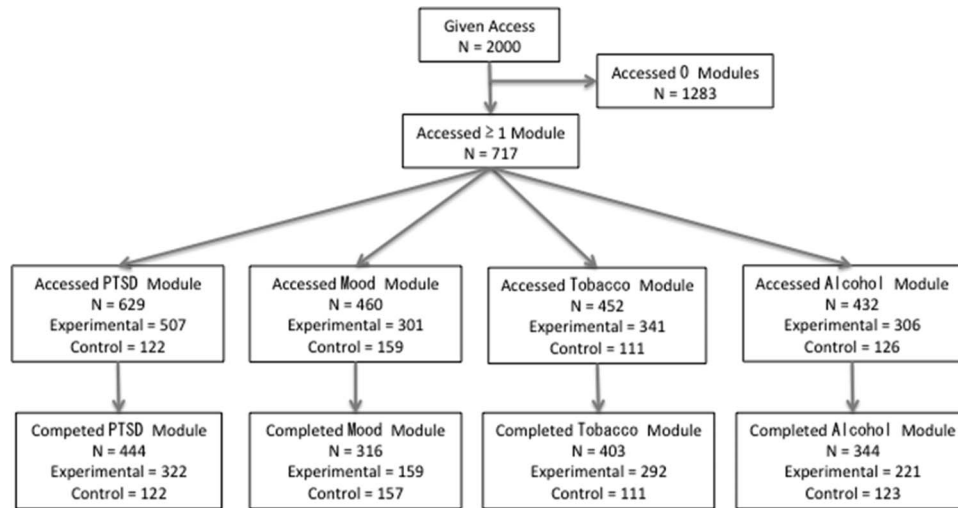
Figure 1. CONSORT diagram demonstrating the rates of access and completion in the total sample. PTSD = posttraumatic stress disorder.

experimental condition, and 167 were randomized to the control condition. Participants in the experimental condition accessed an average of 2.65 (*SD* = 1.28) modules, and those in the control condition accessed an average of 3.02 (*SD* = 1.27) modules. The overall completion rate, defined as completing at least one module, was 73.2% (*n* = 403) for the experimental condition and 99.4% (*n* = 166) for the control condition.

Predictors of Access

Of the 2,000 participants invited to access the Web site, a subset (*n* = 1,765) had sufficient data to be included in a model predicting access to the Web site. The excluded participants (*n* = 235) refused or declined to answer baseline interview questions and, thus, were considered to have not missing at random data. Mental health, disaster exposure, demographics, and service use variables were included in the model. Descriptive statistics for all variables included in the model are presented in Table 1.

The analysis examining predictors of access included both experimental and control conditions because there were no differences in study procedures prior to access (see Table 2). The final model predicting PTSD module access suggested that the access rate was higher among adolescents who met criteria for PTSD (OR = 1.44, *p* = .04), reported drinking alcohol in the past month (OR = 1.71, *p* < .01), had parents who used the Internet to obtain health information (OR = 1.38, *p* = .01), and had more educated parents (OR = 1.16, *p* = .01). Alternatively, adolescents who had older parents (OR = 0.99, *p* = .05), were male (OR = 0.81, *p* = .03), and had tried cigarettes (OR = 0.56, *p* < .01) were less likely to access this module.

The final model predicting mood module access suggested that the access rate was higher among adolescents with parents who used the Internet to obtain health information (OR = 1.40, *p* = .01) and whose parents had more education (OR = 1.16, *p* = .02). Similar to PTSD, adolescents who had tried cigarettes (OR = 0.60, *p* < .01) and were male (OR = 0.72, *p* < .01) were less likely to access the mood module.

The final model predicting alcohol module access suggested that the access rate was higher among adolescents who used alcohol in the past month (OR = 1.54, *p* = .05), had parents with more education (OR = 1.21, *p* < .01), and used the Internet to obtain

Table 1
Descriptive Statistics of Predictors Included in the Models Assessing Access and Completion

Variable	*n*	%[a]
Depression since tornado	162	8.1
PTSD since tornado	153	8.0
Used alcohol in past month	170	8.5
Tried cigarettes	273	13.7
Loss of sentimental objects	210	10.5
Lost pet	81	4.0
Left home for >1 day	600	30.1
Present for tornado	1,806	90.6
Injured from tornado	53	2.7
Concerned for friends and family	1,495	74.8
Lost electricity for 1 week	462	23.1
Lost clean clothing for 1 week	125	6.3
Lost food for 1 week	95	4.8
Lost drinking water for 1 week	86	4.3
Male gender	981	49.0
Hispanic	54	3.0
Black	451	25.4
Parents partnered	1,469	73.5
Teen owns mobile device	1,359	68.2
Teen looked for health info online	731	36.6
Teen looked for mental health info online	292	14.7
Teen looked for tobacco or alcohol info online	154	7.7
Parents looked for health info online	1,385	69.4
	M	*SD*
Teen age (years)	14.5	1.7
Parent age (years)	45.0	9.3
Parent Kessler 6	5.4	5.2

Note. *N* = 2,000. PTSD = posttraumatic stress disorder.
[a] Percentages are based on valid cases for a given variable.

information about substances (OR = 1.50, p = .04). Adolescents who tried cigarettes (OR = 0.64, p = .02), were male (OR = 0.75, p = .01), and were without clean clothing for at least 1 week (OR = 0.40, p < .01) were less likely to access the module.

The final model predicting tobacco module access suggested that the access rate was lower for those who were without food or clothing for more than 1 week (OR = 0.40, p = .01), tried tobacco (OR = 0.51, p < .01), and were male (OR = 0.74, p = .01). Those who drank alcohol in the past month were more likely to access the smoking module (OR = 1.75, p = .01).

Predictors of Completion

Similar models were constructed to identify predictors of completion in the experimental condition (Table 3). Those who screened into the PTSD module by reporting two or more symptoms of PTSD (OR = 6.99, p < .01) were more likely to complete this module. However, adolescents who had used the Internet to look for mental health–related information (OR = 0.46, p = .02) and those who lost sentimental objects (OR = 0.45, p = .03) were less likely to complete this module. The final model predicting mood module completion in the experimental condition suggested that those who screened into the module by endorsing three or

Table 2
Predictors of Module Access

		95% CI	
Predictor	OR	Lower bound	Upper bound
PTSD			
Met criteria for PTSD	1.44*	1.01	2.05
Used alcohol in past month	1.71**	1.16	2.52
Tried cigarettes	0.56**	0.40	0.79
Parent age	0.99*	0.98	1.00
Parent education	1.16**	1.04	1.31
Teen male	0.81*	0.66	0.98
Parents looked for health info online	1.38**	1.01	1.74
Mood			
Tried cigarettes	0.60**	0.43	0.85
Parent education	1.16*	1.02	1.31
Teen male	0.72**	0.58	0.89
Parents looked for health info online	1.40**	1.08	1.80
Alcohol			
Used alcohol in past month	1.54*	1.01	2.35
Tried cigarettes	0.64*	0.44	0.93
Without clean clothes for >1 week after tornado	0.40**	0.21	0.75
Parent education	1.21**	1.06	1.37
Teen male	0.75**	0.60	0.94
Teen searched online for info about substances	1.50*	1.02	2.21
Smoking			
Used alcohol in past month	1.75**	1.15	2.66
Tried cigarettes	0.51**	0.35	0.74
Teen male	0.74**	0.60	0.92
Without food for >1 week after tornado	0.40**	0.20	0.80

Note. Sample size = 1,765 on the basis of the availability of baseline data. OR = odds ratio; CI = confidence interval; PTSD = posttraumatic stress disorder.
* p < .05. ** p < .01

Table 3
Predictors of Module Completion in the Experimental Condition

		95% CI	
[1]PTSD	OR	Lower bound	Upper bound
PTSD[a]			
Loss of sentimental objects	0.45*	0.22	0.94
Looked online for mental health information	0.46*	0.24	0.88
Endorsed >2 PTSD symptoms within the module	6.99**	4.18	11.69
Mood[b]			
Endorsed >3 symptoms within the module	17.86**	6.26	50.94
Alcohol[c]			
Tried cigarettes	0.40*	0.18	0.88

Note. OR = odds ratio; CI = confidence interval; PTSD = posttraumatic stress disorder.
[a] Sample excluded 10 participants who did not have sufficient baseline data (sample size = 434). [b] Sample excluded 41 participants who did not have sufficient baseline data (sample size = 260). [c] Sample excluded 78 participants who did not have sufficient baseline data (sample size = 263).
* p < .05. ** p < .01

more symptoms of depression were more likely to complete this module (OR = 17.86, p < .01). The final model predicting alcohol module completion in the experimental condition suggested that those who tried cigarettes were less likely to complete the alcohol module (OR = 0.40, p = .02). There were no significant predictors associated with completing the tobacco module. Models examining predictors of module completion for the control group were not tested because of low rates of dropout for these modules (ns = 0–3).

Follow-up Data

At the 4-month follow-up interview, 288 of those who did not access the Web site were contacted and asked about their lack of engagement. The most commonly endorsed reason was that they were "too busy" (n = 212). Relatively few participants had concerns about security (n = 24) or privacy (n = 11). Of those who accessed the Web site, 280 of those in the experimental condition were contacted at 4-month follow-up and asked about their experience. The majority of this subsample found the Web site easy to use (n = 214) and would recommend it to others (n = 207). The majority (n = 182) of the experimental condition participants spent between 30 and 90 min on the site, with a notable proportion (n = 71) spending >90 min on the site.

Discussion

This study addressed an important, and unanswered question: If we build a Web-based resource to address adolescents' disaster mental health problems, will they come? The literature has shown that three in four youths with significant mental health symptoms after a disaster do not receive mental health care to address their needs (Fairbrother, Stuber, Galea, Pfefferbaum, & Fleischman, 2004). Alternative solutions are needed to increase access to needed care and to help the health care system address demand in

urban and rural areas. Web-based approaches are scalable and sustainable and may offer significant benefit.

The results suggested that more than one in three adolescents accessed the Web-based treatment, and more than one in five completed it. Given that the resource was available to each participant for 4 months and that approximately 34% resided in nonurban areas, these proportions provide empirical support that a Web-based treatment can achieve high penetration in a relatively brief period. These data are among the first to be reported on use of such an intervention with a large prespecified population of adolescents. Module-specific completion ranged from 52.8% to 85.6%, which is consistent with prior adolescent and adult studies of Web-based treatments (Neil et al., 2009; Price et al., 2012).

Despite these promising numbers, there is considerable room for improving engagement with Web-based treatments in adolescents. Access and use may benefit from the inclusion of social networks (Mohr, Cuijpers, & Lehman, 2011) or interactive content, including games (Brockmyer et al., 2009). Social connections buffer against mental health symptoms (Ozer, Best, Lipsey, & Weiss, 2003), enhance treatment (Price, Gros, Strachan, Ruggiero, & Acierno, 2013), and are hypothesized to increase use of technology-based treatments (Mohr et al., 2011). Integrating social networks may increase use, especially for adolescent boys.

Organized care agencies could use a Web-based treatment as part of the initial response to a disaster to conduct population-level assessments and treatment in remote areas. Such a strategy may successfully treat mild to moderate symptoms in adolescents and identify those with severe symptoms. Those identified as having severe symptoms could be referred for follow-up with a local care agency. This strategy could involve the coordination of state and national agencies, with a larger group deploying the intervention and being able to refer symptomatic adolescents to local providers. Such a strategy is likely to use limited resources efficiently and result in improved mental health at the population level (Draper & Ghiglieri, 2011).

Using the behavioral model of health services use as a framework, our findings identified the subpopulations that Web-based treatments are most likely to reach. Consistent with prior work, the predisposing factor of gender and the enabling factor of parental use of the Internet were most strongly associated with access (Donkin et al., 2011; Neil et al., 2009; Price, Davidson, et al., 2013; Price et al., 2012). Parents who use the Internet may be more likely to actively encourage their children to seek health-related information online. Care agencies should develop strategies to access households that may not regularly use the Internet via a laptop or desktop computer. Therefore, a multimethod strategy in which mobile devices or paper-based approaches are used would likely be necessary to reach different segments of a disaster-affected population.

The results suggest that adolescent boys (33.1%) were less likely to access the Web site than were adolescent girls (38.5%). These percentages, however, were relatively comparable across the genders, and gender was unrelated to completion. The discrepancy between boys and girls was less than what has been observed in studies of access of traditional mental health services (Wang et al., 2005). Adolescent boys are more likely to experience mental health stigma, which is associated with a decreased willingness to use mental health services (Chandra & Minkovitz, 2006). The

increased privacy offered by Web-based treatments may facilitate their willingness to use this treatment.

It is important to note that evaluative need variables were inconsistently related to treatment access. Meeting criteria for PTSD since the tornado according to the baseline interview was associated with an increased likelihood that an adolescent would access the PTSD module. However, this was not the case for depression and access of the mood module. It is often assumed that those with increased mental health symptoms will self-select into treatments when given the opportunity, but empirical support for this has been mixed (Amstadter, McCauley, Ruggiero, Resnick, & Kilpatrick, 2008; Price, Davidson, Ruggiero, Acierno, & Resnick, 2014). To address this limitation, another study identified personalized feedback as a method to enhance access in trauma-exposed samples (Price, Ruggiero, et al., 2014). For example, an adolescent avoiding conversations about the disaster could be given specific social skills training. Providing tailored feedback to high-risk adolescents, perhaps through population-level assessments, may increase their likelihood of accessing subsequent services.

There were few consistent predictors of treatment completion. This may suggest that once adolescents access an intervention, they are likely to complete the content. Such content may be especially useful for those who are highly symptomatic, given that endorsing sufficient symptoms to screen in to the mood and PTSD modules was associated with a higher rate of completion. The lack of significant predictors associated with completion may also reflect the fact that *completion*, defined as reaching the end of a module, is a poor indicator of engagement with Web-based content. Better indicators may include time spent per page, extent of interaction with the content, and knowledge retained from interactive content. Such indicators are also more likely to be associated with response to the treatment (Kiluk et al., 2011). Future work is encouraged to examine Internet-based treatment data at this level.

The present study had several limitations. First, the Web site was intended to be used as secondary prevention but was made available to adolescents months after the disaster. This delay may have allowed a substantial portion of the individuals to recover naturally and thus render the intervention unnecessary. Future research that deploys this approach in the immediate aftermath of a disaster is needed. A first step toward this process would be developing expedited procedures that allow studies to rapidly receive approval from the necessary regulatory bodies. Second, the current study did not include measures that were directly related to Internet use, such as familiarity with technology, estimated time spent on the Internet, and frequent tasks completed on the Internet. Third, adolescents received monetary compensation for participating in the study, which may have inflated overall adherence rates. Fourth, the population-based sample was not highly symptomatic, which may have reduced the level of perceived need for this intervention. However, the use of a population-based sample is a relative strength of this study, as it provides an estimate of use rates should these approaches be widely disseminated. Finally, the present study was unable to obtain detailed data on participant use of the Web site, including time spent per page, clicks per activity, and time to completion. Examining such use variables is likely necessary to understand patient behavior in Web-based treatments and improve the quality of treatment.

The data from the current study provide empirical support for the quick and broad dissemination of Web-based treatments. Such approaches can be part of a multifaceted approach that uses mobile technologies, telehealth, and traditional services in a stepped care approach (Price, Yuen, et al., 2013). Research on access rates, completion rates, usability, and effectiveness of such approaches, particularly for disaster-affected adolescents, will inform dissemination strategies that improve both their appeal and effectiveness.

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