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Summary and Keywords

Results of national epidemiologic surveys indicate that substance use rates among adolescents remain relatively steady or even show slight declines; however, some substance use rates, such as electronic cigarettes, are actually rising. Thus, the need for efficacious drug prevention efforts in the United States remains high. Active Involvement (AI) interventions are a promising avenue for preventing and reducing adolescent substance use, and they create opportunities for adolescents to experience a core feature of engagement that is common to these interventions, such as producing videos, posters, or radio ads; or generating themes and images for messages such as posters.

Existing interventions grounded in theories of Active Involvement include programs delivered face-to-face and via e-learning platforms. Narrative Engagement Theory and the Theory of Active Involvement guide the components of change in AI interventions. Youth develop message content during participation in Active Involvement interventions. Advanced analytic models can be applied to address new research questions related to the measure of components of AI interventions.

Keywords: Active Involvement, adolescent health, engagement, media literacy, message planning, substance use

Results of national epidemiologic surveys indicate that substance use rates among adolescents remain relative steady or even show slight declines; however, some substance use rates, such as electronic cigarettes, are actually rising (Johnston, O'Malley, Miech, Bachman, & Schulenberg, 2016; Substance Abuse and Mental Health Services Administration [SAMHSA], 2014). Thus, the need for efficacious drug prevention efforts in the United States remains high. Although a brief perusal of a national registry (e.g., National Registry of Evidence-based Programs and Practices [NREPP]; SAMHSA, 2016) yields a list of existing prevention programs, continued substance use rates suggest there is more work to be done, including not only the development of new programs but also better understanding how programs (both new and old) work in relation to relevant

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theories of behavior change. This article focuses on AI interventions to prevent and reduce adolescent substance use, a line of research with a solid evidence base that continues to expand as new programs are developed, tested, and disseminated. Thus, this represents an exciting time for scholars interested in this area of research, because with the ongoing development and examination of new programs comes new opportunities for theory development, testing, and application. In this article, we (1) review existing interventions grounded in Active Involvement, including programs delivered face-to-face and via e-learning platforms; (2) discuss components of change of AI interventions as indicated by the two guiding theories in this area: narrative engagement theory (NET; Miller-Day & Hecht, 2013A, 2013B) and the Theory of Active Involvement (TAI; Greene, 2013); (3) outline advanced analytic models that can be applied to address new research questions related to the measurement of components of AI interventions; (4) examine message content that youth develop during participation in AI interventions; and (5) highlight ongoing areas of emerging focus related to both the development and evaluation of AI interventions.

Using Theory to Develop Active Involvement Interventions

Much of the earlier research in the area of Active Involvement interventions, including, for example, research in media literacy and substance abuse prevention, was done without a theoretical understanding of how and why participating in creating prevention messages during an intervention leads to individual attitudinal and behavioral changes beyond merely as a strategy for creating target audience-produced messages. In the last few years, two theoretical approaches have emerged that explain how youth involvement in message development can lead to sustained behavior change: the Narrative Engagement Theory (NET; Miller-Day & Hecht, 2013A, 2013B) and the Theory of Active Involvement (TAI; Greene, 2013). These theoretical approaches are discussed in detail later and describe how engagement in a message development activity can affect cognitions and behaviors. Development of these key theoretical approaches, in addition to critical testing of the proposed processes, is crucial in further expanding this field. Additional clarity surrounding mechanisms of change allows intervention developers and users to focus efforts on key components for change. We start by describing Active Involvement interventions.

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Interventions Utilizing Active Involvement: Development, Components, and Procedures

There are several types of active involvement interventions developed in the past few decades, ranging from those where AI is one component of a larger intervention to those where an AI component is the main focus or primary strategy of an intervention. Overall efficacy of AI interventions has only incorporated evaluation of media literacy programs, and includes analyses through two systematic reviews (Banerjee & Kubey, 2013; Bergsma & Carney, 2008) and a meta-analytic review (Jeong, Cho, & Hwang, 2012). The meta-analytic review concludes that media literacy interventions are generally effective (d = .37) for reducing potentially harmful effects of media messages on adolescents, but it also acknowledges the tremendous variability in intervention methods, methodological precision, and outcome measurement. Delivery for these interventions has varied in terms of target age of participants (elementary, middle school, and high school students as well as college students and even older adults), mode of delivery (face-to-face versus online), delivery setting (large groups, small groups, and individually), timing (short 30–45 minute sessions versus month-long projects or even school semesters), and topics (alcohol, tobacco, and other drugs prevention, violence prevention, body image issues, and others; see Banerjee & Kubey, 2013; Bergsma & Carney, 2008). When developing AI interventions, implementers make key decisions regarding what specific components are needed for proposed effects.

We elaborate below on three groupings of AI interventions. AI interventions have utilized different modes of delivery such as face-to-face interventions, online interventions, or a combination of the two modes. We begin with face-to-face delivered interventions including examples of *Youth Message Development* (Banerjee, Greene, Magsamen-Conrad, Elek, & Hecht, 2015; Greene, Catona, et al., 2016; Greene, Yanovitzky, et al., 2015) and an AI intervention for fall prevention in older adults (Catona, 2015; Catona & Greene, 2015, 2016), both of which end with an AI activity. Next we turn to REAL media, an online media literacy intervention that culminates in an AI activity. Finally, we review a SAMHSA listed evidence-based program, *keepin' it REAL (kiR)*, a school-based substance use prevention intervention (Colby et al., 2013; Hecht & Miller-Day, 2009; Miller-Day & Hecht, 2013A, 2013B) that uses both face-to-face delivery and technology (video supplements).

Face-to-Face Active Involvement Interventions

Face-to-face interventions typically include an adult (researcher or teacher) or peer leader facilitating one or more 45–60-minute sessions for both small and large groups. Examples of face-to-face AI interventions include adolescent media literacy interventions (e.g., Austin, Pinkleton, Hust, & Cohen, 2005; Banerjee & Greene, 2006, 2007; Greene, 2013; Greene, Catona, et al., 2016; Greene, Yanovitzky, et al., 2015; Kupersmidt, Scull, & Austin,

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2010; Kupersmidt, Scull, & Benson, 2012; Pinkleton, Austin, Chen, & Cohen, 2013), a fall prevention intervention for older adults (Catona, 2015; Catona & Greene, 2015, 2016), and others (Andrade, Evans, Edberg, Cubana, & Cleary, 2015; Glik, Nowak, Valente, Sapsis, & Martin, 2002). Face-to-face modes of delivery are the dominant AI delivery mechanism. The benefits of these face-to-face modes of delivery include potential increased involvement (e.g., question asking, follow-up, extension of engaging activities) and relationship building with teachers or staff, but these benefits are balanced against the critiques. Critiques include challenges with intervention fidelity, class time available in schools, resources to cover cost of delivery or training, and difficulty replicating or implementing researcher-led interventions. However, the Center for Media Literacy, an educational organization dedicated to promoting and supporting media literacy education as a framework for accessing, analyzing, evaluating, creating, and participating with media content, argues that media literacy is most successful when it is integrated across the curriculum and, thus, related to national, state, or district educational standards and assessment rubrics (Center for Media Literacy). Through their media literacy curriculum (Project SMARTArt), where teachers were provided training and practice through professional development, teachers were able to demonstrate easy integration of curricula. They devised levels that incorporated the Center for Media Literacy's media literacy framework while meeting state education standards in at least three subjects, accomplishing these tasks in as little as 20 minutes in the classroom (Center for Media Literacy).

Youth Message Development (YMD): An Exemplar of Face-to-Face Delivery

Youth Message Development (YMD; Banerjee et al., 2015; Greene, Catona, et al., 2016; Greene, Yanovitzky, et al., 2015) is an AI media literacy intervention to prevent alcohol use among high school-aged youth (ages 14–16) that was designed for face-to-face delivery. This curriculum was adapted from earlier research on an AI media literacy intervention to prevent smoking among middle school (age 11–14) youth. The original intervention focused on an expanded view of traditional literacy and included representation of media and use of literacy tools to analyze media, resulting in two intervention strategies: (1) Analysis plus Analysis and (2) Analysis plus Planning. The analysis intervention strategy included two face-to-face sessions (30–45 minutes each), with a discussion and critical analysis of pro-smoking and anti-smoking ads; the Analysis plus Planning strategy included two face-to-face sessions, with a discussion and critical analysis of pro-smoking ads and planning of anti-smoking print ads (i.e., posters). The sessions were of equal length and utilized small group activities and multiple pro and anti-smoking print advertisements to illustrate key concepts. Results showed an overall support for the Analysis plus Planning strategy in eliciting more attention and positive workshop perceptions than the analysis workshop (Banerjee & Greene, 2006). The Analysis plus Planning strategy was also successful in changing participants' positive attitude toward

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smoking and behavioral intention to smoke (Banerjee & Greene, 2006, 2007) one month post-intervention.

The formative research to adapt the YMD curriculum included three distinct studies: Study 1: a post-test only pilot study comparing two versions of the preliminary curriculum (comparing an Analysis plus Analysis strategy that analyzed and critiqued pro- and anti-alcohol ads with an Analysis plus Planning strategy that developed a plan to create an anti-alcohol ad poster) and obtaining written and oral feedback from both participating students and their mentors (adults who accompanied students to the intervention); Study 2: interviews with a separate cohort of high school students to assist with selection of new stimulus ads for the preliminary curriculum; and Study 3: focus groups with an additional cohort of high school students and teachers to solicit feedback on a revised version of the curriculum and related materials (Greene et al., 2016). The overall results from Study 1 indicated that students ($N = 182$) and mentors/teachers ($N = 53$) perceived the YMD Analysis plus Planning strategy as more interesting, involving, and novel, and these ratings were associated with increased critical thinking about the impact of advertising, lower alcohol use intentions, and fewer positive expectations about the effects of alcohol use at immediate post-test. Results from Studies 2 and 3 were qualitative and indicated a need to supplement alcohol-focused ad stimuli with ads targeting other advertising images, to use incentives and competition-based activities to further enhance student motivation, and to provide flexibility to enhance the appropriateness of the curriculum to various settings (Greene et al., 2016).

Following this extensive pilot testing and the corresponding adaptations to the curriculum, the resulting YMD intervention was tested prospectively in 2011. This study included 171 high school students from 34 schools across Pennsylvania (representing rural, smaller town, smaller city, suburban, and urban school districts) participating in a 75-minute AI media literacy YMD workshop. The intervention workshop consisted of two parts that were facilitated by the research team. First, with an emphasis on alcohol advertising, workshop leaders introduced media-related terms, described the reach of advertising, discussed the targeting of advertisements to different audiences, described the identification of claims in advertising, explained message counterarguments, and covered persuasion techniques along with message production components. The intervention used examples from print advertisements to highlight key points in the curriculum. To apply these concepts, students completed a small group analysis activity in groups of 4–5 members, in which they discussed and analyzed print alcohol ads, focusing on the ad's claims, target audience, and the persuasion techniques used in advertisements. The small group format allowed students to discuss their ideas and exchange perspectives among one another, and culminated with one person presenting the small group ad analysis to the larger group.

Second, students participated in one of two variants of the YMD workshop: one group completed two analysis activities (analysis), and the other group completed an analysis activity plus a message planning activity (Analysis plus Planning condition). In the analysis sections of both conditions, students identified and analyzed claims missing from

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alcohol advertisements (deconstruction skills) and utilized the skills in analyzing an anti-alcohol ad (counter-advertisement). In the Analysis plus Planning condition, students then planned anti-alcohol posters for their peers. Students completed all activities in small groups that included discussions and group tasks. Finally, the workshops culminated with group leaders in both conditions presenting their group end products (analysis of alcohol counter-advertisements or the anti-alcohol poster) to others attending the workshop to initiate discussion in a larger group setting (Banerjee et al., 2015). The results of the pilot study demonstrated that participants in the Analysis plus Planning group reported greater self-efficacy to counterargue than did participants in the Analysis plus Analysis workshop. Communication about the workshop moderated the effects of the type of workshop on self-efficacy to counterargue. Communicating about the workshop appears to be related to better self-efficacy outcomes for participants of the Analysis plus Planning workshop, and to worse outcomes for participants of the Analysis plus Analysis workshop condition (Banerjee et al., 2015). Thus, three different studies (with additional supplemental data) provide support for the Analysis plus Planning AI condition, highlighting the interesting, involving, and novel aspects of the Analysis plus Planning YMD curriculum.

In recent years, some of these face-to-face interventions have been adapted to be delivered as interactive web-based programs designed to enhance in-depth individual learning. For instance, the web-based AD IT UP program was adapted from the face-to-face, facilitator-led anti-smoking media literacy curriculum with the same name (e.g., Phelps-Tschang, Miller, Rice, & Primack, 2015; Primack, Douglas, Land, Miller, & Fine, 2014; Shensa, Phelps-Tschang, Miller, & Primack, 2016). The benefits of online programs include a focus on individual engagement (face-to-face delivery can encourage social loafing and is easily dominated by several active individuals in a group); standardization of delivery, which ensures program fidelity; and online technology/gaming characteristics such as self-paced lessons, repeatable nature, and utilization of emerging technology/gaming preferences among the target audience (e.g., youth). Critiques include a potential contribution to the digital divide, where groups with health disparities or less resources potentially have poorer access, greater technical glitches, and difficulties updating and maintaining online content, which leads to outdated interventions.

Online Active Involvement Interventions

REAL Media: Using an e-Learning Platform to Involve Youth in Message Development

REAL media was adapted from the promising, face-to-face YMD program (Banerjee & Greene, 2006, 2007; Greene et al., 2016), to become an interactive, e-learning media literacy curriculum that prevents substance use among youth ages 13–15. It is designed for

delivery via community groups and was developed in collaboration with the 4-H organization. Similar to YMD, REAL media is grounded in the TAI (Greene, 2013) and aims to (1) increase knowledge of advertising techniques used to sell alcohol, tobacco, and other drug (ATOD) products and products generally; (2) develop counterarguing and critical thinking skills; (3) guide the application of these skills to the creation of anti-ATOD messages; and (4) encourage the proliferation of youth messages to peers via social media.

REAL media consists of five lessons and includes both analysis and planning components, consistent with the results from the YMD study. Levels are delivered online through a customized Learning Management System (LMS) in which users create individual accounts to access the levels at their convenience or as specified by their group leaders. REAL media is self-paced, such that individuals have the ability to navigate each level at their own speed. Level 1 offers youth an introduction to media and advertising with content on costs and ethics. Level 2 introduces youth to the concept of a target audience and covers the persuasive strategies used in advertising. Level 3 focuses on the concepts of claims used in an ATOD message and on counterarguments that can be applied to anti-ATOD messaging. Level 4 emphasizes production techniques used in making ads, including visuals, characters, setting, and sound. Finally, Level 5 culminates with the planning and production of an anti-substance message in which youth are encouraged to apply the content learned in prior levels. Messages are then submitted to an online contest hosted via social media in which youth are encouraged to have their peers view and vote on their messages. Levels 1–4 range from approximately 15–25 minutes in length, and Level 5 length is learner determined, as learners can choose to spend any amount of time on the planning and production of their anti-substance message.

Advantages of REAL Media

The e-learning format offers a number of advantages to the face-to-face YMD curriculum from which it was adapted. First, it allows community groups the flexibility to customize delivery to group members consistent with their needs. For example, youth can access the levels during group meeting time, complete the levels on their own outside of a designated meeting time and then discuss within group, or a combination of both. Second, the individual focus allows for engagement by all youth who complete the curriculum, whereas the group-focused YMD program makes it difficult to determine the extent to which all individuals contribute to the active components of the program. Third, online delivery format increases fidelity and implementation quality because it standardizes delivery by eliminating the need for in-person facilitators. This is also advantageous for organizations that seek to implement the program because it eliminates their need to train staff to deliver program content. Finally, the use of technology to deliver the program, along with the social media-based message diffusion via the contest

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to determine the best anti-ATOD messages, offers an engaging and interactive product to media savvy youth, consistent with theoretical premises.

Development Process

REAL media was developed over the course of nine months in collaboration with 4-H staff, leaders, and members in both New Jersey and Maryland and with funding from the National Institute on Drug Abuse (NIDA R41DA039595). There were three phases to the development process: (1) formative research to guide the adaptation of content to the 4-H audience as well as to an e-learning program; (2) the design and pilot testing of the e-learning program; and (3) revisions followed by a usability test with an additional, independent sample of 4-H members and leaders.

Formative Research

Hard copy or printed versions of the levels were adapted from YMD for online delivery with 4-H youth, including revisions to content, images, and interactive features. Focus groups were then conducted with both 4-H members ($N = 19$) and leaders ($N = 8$) in New Jersey to obtain reactions to the proposed curriculum. Members and leaders provided feedback on the curriculum plans and brainstormed ideas regarding the transfer of content to an online delivery platform, specific ads for inclusion to illustrate various concepts, quantity of voiceovers, pacing, acronyms, challenges to review level content, and interactive features to maximize engagement with the website. They also offered suggestions for framing content to make it appropriate and most appealing to their age group. In addition, participants responded favorably to the proposed online contest in which anti-ATOD messages are shared with family and peers on social media. They offered feedback on popular social media platforms to use, as well as on desirable contest incentives, acronyms, and program names.

Design and Pilot Test

The focus group findings led to a revision of the curriculum plan, which was then turned over to a web-design company hired to create the e-learning program. This consisted of an intensive and iterative process in which the design team produced an initial build of each level, which was then tested several times by the research team for functionality and completeness. After each test, feedback was compiled and the research and design teams met to discuss necessary changes. This process continued until each level was built to satisfactory standards, yielding a functioning prototype of the online curriculum.

Similar to the focus groups, pilot testing was held with both 4-H members ($N = 38$) and leaders ($N = 5$) in clubs in New Jersey. Participating members and leaders were provided with a laptop computer and instructed to complete as many levels of REAL media as they could within the 2-hour time frame. They rated each level on performance and engagement and offered feedback on likes and areas for improvement. As there was not sufficient time for members and leaders to create a poster/video as a part of level 5, they

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were instructed to only complete the poster/video planning process as guided by the planning questions within the level, with no expectation of actually producing an anti-substance message.

Results of the pilot suggested that REAL media was received very positively by 4-H members and leaders. All quantitative ratings were above the neutral point, with mean values ranging from *Agree* to *Strongly Agree* for most indicators of engagement (realism, interest, and relevance) and close to *Agree* for indicators of involvement (perceived novelty and critical thinking). Scores for personal reflection, the third indicator of involvement, were closer to neutral, which is to be expected given that substance use rates in this group were likely low overall. In addition to the quantitative ratings, participants reported the curriculum to be fun, engaging, and informative on open-ended evaluation items. Engagement in the program was further supported by the program's user data. Participants offered thoughtful, involved responses to open-ended questions throughout the program, including the more challenging concepts such as generating counterarguments to the claims they perceived to be present in sample anti-ATOD advertisements. Also, all participants chose to engage in at least 2 of 10 segments of optional depth (i.e., additional content presented throughout each level they were not required to view), with 45% viewing 5 or more optional depth segments.

Participants also offered constructive feedback to improve upon the version tested during the pilot phase. This feedback captured both technical elements of the program, as well as a few content areas that could be improved. Edits were then made prior to the usability test.

Usability Test

The final step consisted of a usability study conducted by an independent researcher outside of the core project team with a sample of 4-H members ($N = 19$) and leaders ($N = 3$) in Maryland. Procedures mirrored the pilot testing, with the exception that the evaluations completed by members and leaders collected at the end of each level focused primarily on measures of usability.

Similar to the pilot testing, the reception of REAL media was overall positive. Usability ratings were high and reinforced by qualitative feedback from members and leaders. Although efforts to fix technical glitches were implemented after the pilot test, not everything was successfully adjusted prior to the usability test. Accordingly, we received additional feedback in this domain (e.g., issues with the log-in page), consistent with our expectations. It was also not surprising to receive some feedback suggesting more clarity was needed for certain concepts, as well as feedback on the length of various aspects of the program.

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Current Status

Since the initial development of REAL media, efforts have been focused in two areas. First, given that we were able to establish feasibility of the curriculum, we are in the process of securing funding to conduct a large-scale group randomized control trial among 4-H youth in multiple states. Although we know 4-H youth liked the program, as evidenced by the pilot and usability tests, effects on their substance use behaviors have yet to be established. Thus, this next step will offer clarity as to the impact of REAL media on ATOD use, as well as allow for a test of theoretical mediators and moderators as posited by TAI (Greene, 2013).

Second, we are working with community organizations beyond 4-H who are interested in implementing the program for their youth. For example, we are currently working with D.A.R.E. America to adapt a version for their use, renamed REAL messages, as a part of a comprehensive drug prevention curriculum for high school students that is under development. This process involves rebranding the curriculum for D.A.R.E. as well as holding collaborative meetings to determine whether other organization-specific changes need to be made. Similar to the process by which 4-H members and leaders offered feedback on the content and images used in REAL media, leaders within D.A.R.E. offered their reactions, and changes were made accordingly (e.g., not including images deemed to show too much skin such as advertisements with shirtless males).

Finally, to support both efforts, we are revising the core curriculum to incorporate the feedback generated from 4-H youth in the previous pilot and usability studies. These revisions are focused on clarifying content that youth indicated to be difficult to understand (e.g., identifying counterarguments and incorporating them into prevention messages) as well as improving technical elements of the program (e.g., employing a more user-friendly LMS to access the e-learning content).

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Active Involvement Interventions Combining Face-to-Face and Mediated Channels

keepin' it REAL by Involving Youth in Message Development

The story of the substance use prevention curriculum *keepin' it REAL* is one best told "from kids through kids to kids." The *keepin' it REAL* or kiR co-creators, Miller-Day and Hecht, believed that the best stories resonate with people because they are indigenous or native. When people share stories with each other, they have impact because they are personal narratives, and the best stories are told in an engaging yet personal style. Research supports these beliefs, with user-generated messages increasing commitment and efficacy for action (Evans, 2013). These user-generated messages are engaging (Lee, Hecht, Miller-Day, & Elek, 2011; Miller-Day & Hecht, 2013B) and effective in creating behavior change (Andrade, Evans, Edberg, Cubana, & Cleary, 2015; Evans et al., 2015; Hopfer & Clippard, 2010; Miller-Day & Hecht, 2013A). Based on the notion that naturally occurring storytelling processes could be harnessed to promote healthy behaviors, the project now spans decades and is disseminated worldwide.

At its heart, kiR is based on the identification of key mechanisms for health promotion and use of culturally grounded narratives about those mechanisms to promote pro-social behavior. In a sense, risky and unhealthy behaviors are "re-storied" to those that are safe and healthy. For example, if the story of drugs is one of users being mature, adventurous, and popular (Miller-Day, Alberts, Hecht, Krizek, & Trost, 2000), the goal is to provide positive counter-narratives about non-use. The involvement of members of the target audience is vital to this process in both message generation (e.g., basing messages on narratives) as well as message production (i.e., having participants create the messages).

From Kids—Involving Youth in Designing Message Content

The first step in developing messages is identifying prototypical narratives about the key change mechanisms. The first project was youth substance use prevention that targeted 12–14-year-old adolescents during 7th grade, the typical age when substance use initiates as attitudes and norms shift from anti-drug to more positive toward use (e.g., Johnston et al., 2016; SAMHSA, 2014). Accordingly, the mechanism of change was the social influence processes involved in drug offers. Peers become more important during early adolescence (Gifford-Smith, Dodge, Dishion, & McCord, 2005), and the social influence strategy was predicated on teaching "resistance skills" or strategies for resisting negative peer influence (Miller-Rassulo, Alberts, Hecht, Krizek, & Trost, 2000). This was added to the skills identified by communication competence theory (Spitzberg & Cupach, 1984), with

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the goal of promoting competent resistance without implying that "everyone is doing it" (i.e., the risky behavior) while also conferring anti-drug norms, a powerful mechanism of drug prevention (Cialdini et al., 1990; Hansen, 1992).

In an effort to develop the narratives to re-story drug use, the researchers sought "indigenous" narratives—that is, narratives that are grounded in the target culture. Notably, this was easier said than done because working in the context of adolescent substance is not like gathering college students and asking for stories about dating—substance use has very serious legal and other consequences. For example, the first school utilized in the project, unbeknownst to the research team, had recently conducted an undercover police sting, understandably resulting in students not wanting to talk about substance use. In other work, college students were used to collect narratives only to discover that most responses were brief and not in narrative form, perhaps due to the poor training and/or supervision they received from the group we hired to oversee the process. Soliciting narratives requires creating a conversational style of interviewing (Miller et al., 2000) and moving the conversation into controversial and sensitive topics rather than just "going there." We use the first part of the interview to establish rapport and a narrative framework by asking about their day or having them describe their neighborhood. If the response does not come back in narrative form, the interviewer might respond with a narrative about their day or neighborhood and then ask another "tell me a story question." When we ask about drug offers, we phrase it as wanting to know about the "who, what, and where" of what happened. Ultimately, these rich narratives produced a repertoire of resistance strategies that were labeled REAL (refuse, explain, avoid, and leave) and have replicated across age, ethnic, gender, and regional differences (Colby et al., 2013; Miller-Day et al., 2013). More importantly, they produced the content (from kids) used to develop prevention messages. That brings us to the "through kids" component.

Through Kids—Involving Youth in Message Production

In kiR there are two places where youth produce their own messages. First, high school students were enlisted to produce five videos, one introducing the curriculum and four teaching each one of the four resistance strategies. Basic training was provided on producing narrative docudramas using the research team's prevention strategy. Guided by a professional videographer, the team developed scripts from prototypical narrative interviews that were provided by the high school students. The research team served as "producers" providing feedback on fidelity to the narratives and prevention strategy for script concepts, script drafts, and rough cuts. For example, fear appeals (e.g., a story element where a smoker vomits profusely during a basketball game was removed) or morality (e.g., preaching about the evils of drugs) were removed, while scenes promoting group resistance (i.e., showing more people saying no than using) were enhanced to promote normative influence. The original videos won four regional Emmy Awards for

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student production. Moreover, research shows that mere exposure to videos during the 7th grade implementation produces an independent effect on substance use (Warren et al., 2006).

Secondly, to heighten and maintain an effect, an 8th grade "booster" program was developed and implemented in which youth created their own anti-drug messages (Krieger et al., 2013). A series of levels was created based on the training provided to the student videographers, and students made their own posters or radio and TV PSAs. These messages were then displayed or played in the schools.

Summary

Youth message design is a core strategy in the *keepin' it REAL* curriculum, a curriculum that now reaches almost a million youth in the United States, as well as those in more than 52 other countries. The success of this curriculum in reaching such a wide audience and reducing their risky substance use largely rests on the "from kids through kids to kids" philosophy. The richness of this process, its rewards in seeing youth learn new skills and feel pride in their own accomplishments, only add to the satisfaction we feel with the process.

Comparisons of the two delivery modes (face-to-face versus online) are warranted. Whereas face-to-face interventions are posited to be more involving and engaging, online interventions are more novel and can be tailored (Soetens, Vandelanotte, de Vries, & Mummery, 2014). However, no study to date has compared the effectiveness of face-to-face versus online versions of the same AI interventions, but a meta-analysis on increasing physical activity heralded face-to-face interventions as more effective on outcomes than online delivered interventions (Conn, Hafdahl, & Mehr, 2011). One cannot be certain that findings related to physical activity interventions will generalize to those targeting outcomes such as substance use. There are likely to be positive prevailing norms about physical activity and negative norms about substances. In addition, substance use may be illegal, particularly for those who are underage. Finally, activity interventions are promoting a behavior while substance use prevention interventions are attempting to prevent or stop a behavior. Thus, the same underlying intervention strategies may not work for these different health behaviors and will remain an area for further research.

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Measuring Engagement in Active Involvement Interventions: Components of Change

As noted previously, two different theoretical approaches address how AI interventions influence the process and targets of behavior change: the Narrative Engagement Theory (NET; Miller-Day & Hecht, 2013A, 2013B), and the Theory of Active Involvement (TAI; Greene, 2013). Both theoretical approaches posit that youth involvement in message development is key to behavior change because it heightens engagement with the messages created by youth themselves. This process of youth involvement produces changes in outcomes of interest (message processing, cognitions, behaviors, and interpersonal communication) among youth creating the messages. The similarity in both TAI and NET lies in the evaluation of youth engagement, considered to be a key mechanism of change; the difference lies in the broader causal processes of behavior change described in both approaches.

Using Narrative Engagement Theory

Many, although by no means all, youth involvement interventions are narrative in nature. For example, youth can create information or education campaigns that are didactic in content and form. However, narrative messaging is emerging as a powerful strategy because this message form has the unique ability to address resistant, low involvement, and hard-to-reach audiences by making complex information comprehensible (Andrade et al., 2015; Evans et al., 2015; Hopfer & Clippard, 2010; Miller-Day & Hecht, 2013A, 2013B), perhaps because these messages are a pervasive and transcultural message form (Miller-Day & Hecht, 2013B). Indeed, it has been said that humans are inherently storytelling animals (Clandinin & Connelly, 2004). As a result, narrative messages are becoming a more popular form for health promotion messages. The emerging new social media encourage this strategy as people exchange stories in both words and pictures, although often in truncated form. But what makes something a narrative?

In our opinion, the word narrative has been stretched to point of almost non-recognizable form. All testimonials, for example, are not narrative; in fact, in our view, many are didactic presentations of information (see Niederdeppe, Kim, Lundell, Fazili, & Frazier, 2012). Narratives include characters and plot in the retelling of a sequence of events that are significant or consequential for the narrator and or audience (Miller-Day & Hecht, 2013B). These narratives represent both a way of thinking or remembering as well as communicating.

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The goal of any narrative-based intervention is to engage the audience. The advantages articulated above accrue because audiences tend to be more emotionally and intellectually involved with these messages than other message forms (e.g., dry evidence or information). The question, then, becomes how to measure this engagement as a key mediating factor between messages and message effects (e.g., behavior change). Rather than substitute a global construct like "persuasiveness" (i.e., asking people if they are likely to be persuaded before measuring whether they intend to behave a certain way) that is unrelated to engagement, constructs such as interest, identification, and realism should be used that reflect what makes a good or effective narrative.

Narrative theorists would almost uniformly argue that engagement with plot and characters are the two key constructs to be measured (see Miller-Day & Hecht, 2013B). The realism of the plot and identification with the characters are two of the key elements of engagement with the story. Realism taps into a sense that the plot is grounded in personal experiences that resonate for the message recipient. Identification denotes a sense of connection with the characters. However, engagement also involves the intensity of attention to the message (Green & Brock, 2002) and we designate interest as a third core construct. These three factors—realism, identification, and interest—constitute the model described in NET (Miller-Day & Hecht, 2013A, 2013B).

A scale was developed with items constructed to reflect the three dimensions. The original 14-item scale was subjected to both exploratory and confirmatory factor analyses that showed the scale had three dimensions (identification, interest, and realism with reliabilities of .86, .89, and .90, respectively; Miller, Hecht, & Stiff, 1998). In the interest of parsimony, a shorter, 9-item version consisting of 3 items for each dimension was developed and found to have 3 factors when examined by a second confirmatory factor analysis (Lee et al., 2011). Path analysis showed realism and interest but not identification to be predictive of substance use intentions. Finally, the measure was tested among a rural adolescent population (Shin, Miller-Day, Hecht, & Krieger, 2015). Alphas were .80 or higher for interest, realism and identification, with CFA again confirming the 3-factor model. Structural equation modeling demonstrated that, as predicted, interest and identification were significantly related to refusal efficacy, which was significantly related to substance use. However, predictions were not supported for realism. Thus, these studies provide strong evidence for the psychometric properties of the 3-factor scale as well as its predictive validity, with the proviso that different factors seem to be operative in different situations.

Summary

Narrative engagement is theorized to be one of the ways of evaluating youth involvement in message development. The three components or factors are strongly supported by our research, and predictive validity is also strong. In addition, this model should prove useful

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in developing narrative messages by pointing to factors that should be addressed explicitly, as well as providing pilot test data. While there are a number of techniques for developing engaging narratives, we argue that developing scripts from indigenous narrative, those from audience members, is an effective strategy for creating interesting and realistic narratives with which audiences can identify. This does not preclude the need for quality script writing and production, although some of our messages were developed by amateur student videographers. Future research should examine the effects of creating the messages on message producers themselves, as well as the factors that influence the level of engagement in the message production process and the message reception process.

Using the Theory of Active Involvement

When youth plan and then create their own message for dissemination to other youth, they are invested in using the appropriate form, structure, and content that will make their message appealing to others like them to achieve their persuasive goal. This process of using a "hands-on" activity to increase engagement in youth participants has been described in detail in the TAI (Greene, 2013). The TAI describes a dual component model of engagement, which is a necessary mechanism for bringing in attitudinal and behavior change. Thus, engagement, as described in TAI, consists of arousal (defined as heightened reaction to a stimulus that increases people's motivation to process the message; Bryant & Zillmann, 1984) and involvement (defined as identification of personal relevance of a stimulus that increases people's motivation to process the message; Petty & Cacioppo, 1986). These two features are key in the TAI processes to trigger intervention effects.

When an AI intervention is sufficiently able to engage its participants, they display an increase in their comprehension about a topic and related activities, and a perspective to comprehend how others may think and react to a message that they plan. These critical thinking skills allow for a phase of self-reflection whereby participants are able to reflect on their risky behaviors and consider lower risk alternatives and/or why others may choose to engage in riskier behaviors. Working in small groups can allow participants to gain an appreciation of how others analyze key issues raised during intervention exercises and can further strengthen self-reflection. Participants can use other members of their group as sounding boards for their discussion of why certain behaviors are riskier activities or alternatives that are lower risk or healthier choices. These processes are described as affecting cognitions and behaviors, both in the short term and long term (Greene, 2013).

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Examining the Content of Messages Developed Under Active Involvement Interventions

We described that youth involvement in message development is necessary for success of interventions that are targeted at youth because it leads to the acceptance of messages developed by youth themselves, as posited in both TAI and NET. Several studies have been published that examine the content of these messages (Banerjee & Greene, 2013; Banerjee, Greene, Hecht, Magsamen-Conrad, & Elek, 2013; see also Krieger et al., 2013).

One study stems from early research with youth smoking prevention that laid the groundwork for the existing YMD curriculum (see above; Banerjee & Greene, 2006, 2007). Students (N = 144; age 11–14; grades 6–8; two northeastern schools in the United States) in the Analysis plus Planning condition worked in small groups to plan and create anti-smoking posters. A content analysis of the resulting 50 posters described that appearance-related factors (i.e., appearance effects of smoking, such as black and/or yellow teeth or wrinkled skin; 44%) were most commonly used to convey harmful effects of smoking, followed by messages about death and dying (30%), before–after effects of smoking (22%), other sickness-related effects of smoking including appearance of black lungs in images but no mention of cancer, a person lying in a hospital bed, impotence, emphysema, asthma, heart disease, and birth defects (20%) and cancer (12%). About half the posters (54%) included a slogan (written message to highlight the main point of the poster), with "do not smoke" messages and health effect messages dominating the type of messages included in the slogans (Banerjee & Greene, 2013).

Another study was a test of the YMD intervention targeting high school alcohol use (Greene et al., 2016). Students in the Analysis plus Planning condition worked in small groups to produce anti-substance posters, this time focused on "why being alcohol free is a good decision." The poster planning activity was composed of multiple steps and took between 20 and 25 minutes for completion. First, the groups discussed why some students choose to drink and planned an anti-alcohol message that would resonate with other students their age; this planning process lasted approximately 10 minutes and played a crucial role in actively involving the students in critically thinking about and planning their messages (see TAI; Greene, 2013). Second, each group was instructed to choose the main point or message for their poster and focus on one or several counterarguments against drinking alcohol to support their prevention message (the poster could reflect one or many consequences of drinking/not drinking). Third, students selected persuasive techniques and production components to draw the target audience's attention to the counter-ad. Finally, after completing the key message planning activity, the groups received poster-size paper and colored markers to create the counter-ad poster. This activity was also piloted with undergraduate students at a large northeastern university. The total number of planned posters consisted of 49 print alcohol counter-advertisements created by small groups of high school students from across Pennsylvania

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and 23 created by college students in New Jersey (total $N = 72$). A content analysis of these posters revealed that the most frequently used message was negative consequences of alcohol use (displayed in 67% of the high school posters and 61% of the college posters), followed by both negative consequences of alcohol use (e.g., prison) and positive consequences of not using alcohol (e.g., graduation) in the same poster (displayed in 26% of both high school and college posters). Positive consequences of not using alcohol were displayed in the least number of posters (6% of the high school posters and 13% of the college posters). A detailed review of the negative consequences displayed in posters indicated thematic differences between high school and college student posters. In particular, for high school student posters, alcohol-related illness was the most frequently depicted negative consequence of alcohol use, followed by physical consequences, death, emotional consequences, drinking and driving, jail, alcohol-related disease, and sexual encounters. For college student posters, emotional consequences were the most frequently portrayed negative consequence of alcohol use, followed by alcohol-related illness, sexual encounters, drinking and driving, jail, death, and physical consequences (alcohol-related diseases were not depicted in any of the college student posters; Banerjee et al., 2013). These findings suggest that long-term effects (such as liver damage, cirrhosis, and hepatitis) may not be perceived as important by adolescents compared with more immediate and short-term outcomes of alcohol use (such as vomiting and hangovers). This is consistent with literature that indicates that younger and middle adolescents may not have developmental maturity sufficient to anticipate longer-term future consequences such as those portrayed in college student poster themes. This finding merits further exploration to understand how best to develop and disseminate alcohol prevention messages that resonate well with different audience types. Figures 1 and 2 present examples of anti-alcohol posters created by high school students.
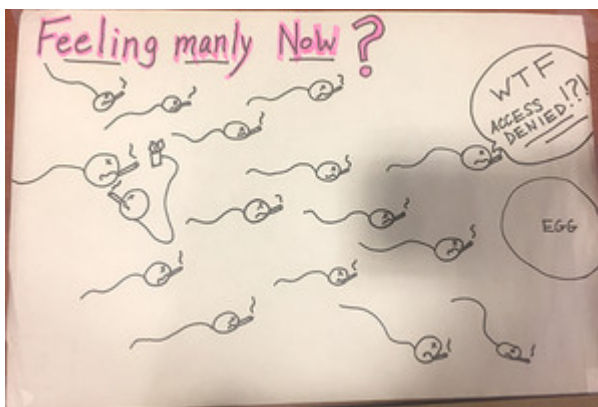

Click to view larger

Figure 1. Anti-Smoking Messages Developed by Middle School Students.

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Figure 2. Anti-Smoking Messages Developed by Middle School Students.

Click to view larger

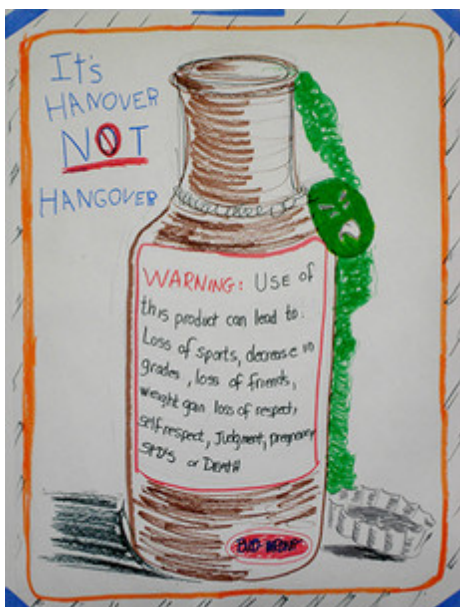*Figure 3.* Anti-Smoking Messages Developed by Middle School Students.

Click to view larger

Figure 4. Anti-Smoking Messages Developed by Middle School Students.

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Figure 5. Anti-Alcohol Messages Developed by High School Students.

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Figure 6. Anti-Alcohol Messages Developed by High School Students.

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Figure 7. Anti-Alcohol Messages Developed by High School Students.

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Figure 8. Anti-Alcohol Messages Developed by High School Students.

Resolved/Unresolved Issues in Developing and Evaluating Active Involvement Interventions

While AI is becoming more popular as an intervention and educational strategy, many questions remain. These include questions that are both theoretical (i.e., why and how it works) and practice oriented (i.e., how best to implement). We start with the areas open for further theoretical inquiry.

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The theoretical frameworks for AI implementations could also be framed broadly within other health promotion approaches. For example, some might use the Theory of Reasoned Action (Ajzen & Fishbein, 1980), the Health Belief Model (Rosenstock, 1974) or Social Cognitive Theory (Bandura, 1986). However, these are not ideally fitted to the particular process of understanding how AI interventions influence attitude and behavior change. For one thing, they rarely address the activity part of the involvement. They treat the intervention holistically rather than focusing on the activity strategy. From this perspective, viewing user-generated messages, for example, should have the same effects as creating them.

However, broader behavior change theories rarely address the involvement or engagement aspect. We argue the participation in message development is more engaging than merely viewing messages or other content. Instead, broader theories consider AI as just another health intervention that either impacts intentions or creates models focusing of the predictors. We feel this is just part of the story, which is why the TAI was proposed. Unfortunately, TAI has yet to be fully tested, so theoretical issues related to mechanisms of change remain at present. NET has supporting evidence (Lee et al., 2011) but not as a direct test of active engagement in the way discussed in this entry. Future tests of both TAI and NET can help unravel some of the theoretical questions, for example, related to the role of engagement in change.

An added unresolved issue in the development and evaluation of AI interventions is the lack of or missing international scholarship from the literature. Although the kiR substance abuse prevention intervention has been adapted in multiple countries, including Brazil, Canada, and the United Kingdom, there is a scarcity of published research examining the efficacy of these interventions. Aspects of AI have been briefly incorporated in some entertainment-education programs, which are defined as media messages that have been purposely designed and implemented to both entertain and educate (Pitt, 2006). However, a review of entertainment-education programs is beyond the scope of this article.

Why Is Active Involvement Effective?

In contrast to the aforementioned theories, we argue that any theory used for AIs should explain the effects of the activity dimension of this intervention strategy. This means understanding the nature of activity as well the nature of involvement. For example, media literacy interventions can vary from those that stimulate cognitive activity to those that encourage a critique of messages and/or the formulation of counterarguments. The "active" in "active involvement" is cognitive, or changing the way information is processed. One might ask, as we have, do participants have to be more active—do they actually have to perform some behavior based on these cognitive changes? For example,

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do they have to plan and/or execute an actual prevention message, or is planning alone sufficient, and is the planning activity heuristically or systematically processed? At the root of some of these questions is understanding *how* changes occur.

How Active Is the Involvement?

Secondly, we need to examine the nature of the involvement. Not all AI interventions actually are involving in the sense of engagement or immersion. A meta-analysis should consider this question in coding the interventions because all are not equally involving. Of course, there are questions about how to conceptualize involvement. If the intervention is narrative in nature, we would propose NET (Miller-Day & Hecht, 2013A, 2013B) that poses three dimensions: realism, interest, and identification. However involvement is conceptualized, it should be specified rather than assumed in theories and models. In media literacy, is message planning a sufficient activity to produce behavioral change or do messages have to be produced?

While theory and practice are linked, the science of practice often gets neglected. In the early years of prevention science, it was often assumed that if we could just train implementers and they did their job, the curriculum would work as planned each time. Thus, it was assumed that an "effective" intervention would be effective if implemented with fidelity. As we obtain more experience with the emerging field of implementation science (Bosworth, 2015), we realize the implementation quality—how well an intervention is implemented—is more important than whether it is implemented exactly as planned. For example, if we are talking about risk and someone discloses a very traumatic event, merely staying on a lesson script is very poor implementation quality. In this instance, an implementer must address the disclosure (and perhaps take additional action, depending on the context), but it would also be poor implementation quality if the rest of the session was spent on this topic. In addition, if something is clearly not working (e.g., students cannot answer the most basic questions), then continuing those practices as planned is poor quality. Research related to *keepin' it REAL* has focused on this issue in depth. Miller-Day and colleagues (Miller-Day et al., 2015) reported that increased narrative quality within a prevention lesson was associated with increased student engagement. Specifically, those students whose teachers employed narratives to gain students' attention, heighten identification with a concept, provide a personal testimonial, or provide an illustrative example were more attentive to and participated more in the lesson. Another study by this team (Pettigrew et al., 2015) reported that teachers' overall implementation quality of drug prevention lessons, including teacher attentiveness, enthusiasm, seriousness, clarity, and positivity, predicted reductions in students' overall substance use.

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Thus, one must ask, how does AI get implemented? What happens when the intervention is practiced in a world we consider real (e.g., developer is not looking over the implementer's shoulder)? Not only do we need more general theories of implementation science but, as well, we need a theory to explain AI implementation. What happens when one of the participants is more skilled than the lessons assume? When participants integrate new or emerging technologies that the implementation did not consider? When they use transmedia or cross-platform technologies? When participants bring in novel persuasive strategies?

The theory and practice of AI as an emerging prevention strategy must evolve and emerge, too. Borrowing from existing theories like SCT can give us an initial perspective on options for change, but if AI is a new strategy, then it requires new ways to conceptualize the process. This is the challenge moving forward.

Analytic Models Used in Measurement of Active Involvement Interventions

Earlier in the article we discussed similarities and nuances in the measurement of AI interventions, including components of change in both NET and TAI. Here, we discuss several analytic techniques and their application to AI interventions that, if applied, could advance research with regard to both the theory and impact of AI interventions.

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Structural Equation Modeling

Structural Equation Modeling (SEM) is a technique that is useful for testing the causal processes hypothesized in a given theory (Byrne, 2010; Stephenson, Holbert, & Zimmerman, 2006) and is of particular relevance for advancing our understanding of the mechanisms involved in both NET and TAI. In their overview of SEM for health communication researchers, Stephenson et al. (2006) describe the two key components of an SEM model. One is the structural model, which refers to the relationships between variables. Essentially, this can be thought of as a series of regression equations. Whereas in a simple regression model there is only one equation (e.g., the relationship between the independent and dependent variable(s), or the impact of variable A on variable B), SEM allows for the examination of a series of equations that capture a specified process (e.g., the impact of Variable A on Variable B, Variable B on Variable C, and Variable C on Variable D). The second component is the measurement model, which links observed variables (i.e., measures that researchers typically collect through surveys or observations) to latent variables (i.e., an unmeasurable theoretical construct) and therefore allows for the quantification and subsequent correction of measurement error. Conceptually, SEM can be thought of as a combination of confirmatory factor analysis and regression. Model parameter estimates indicate the nature of the relationships between variables in the model, and goodness of fit indices provide an indication as to how well the raw data map onto the specified model. Common fit indices include the Chi-Square Test, Root Mean Square Error of Approximation (RMSEA, Steiger, 1990), Comparative Fit Index (CFI; Bentler, 1990), and the Normed Fit Index (NFI; Bentler & Bonett, 1980), although there are others. These fit indices should be examined along with parameter estimates for overall interpretation of the model (Byrne, 2010).

So, how does this make sense in the context of AI interventions? We described an application of SEM to measuring engagement in NET above. However, this has yet to be applied to testing the hypothesized causal process underlying TAI. Thus, if we demonstrate effects of participation in REAL media on intentions to use substances and substance use, SEM could be applied to confirm whether the hypothesized TAI model explains those effects. More specifically, SEM would allow us to confirm the hypothesis that engagement, knowledge and skills, reflection, and expectancies and norms, the key constructs of TAI, mediate the relationship between intervention condition and behavioral outcomes in a single model. The TAI conceptual model posits that engagement impacts immediate intervention outcomes such as an increase in knowledge and skills. Knowledge and skills are posited to lead to increased reflection on the knowledge content received. In turn, reflection is hypothesized to lead to change in cognitive targets including expectancies and norms, which are thought to affect long-term outcomes including intentions and, ultimately, the target behavior such as substance use. Thus, TAI posits a relatively complex process that is beyond the scope of a traditional regression analysis and quite suitable for an SEM approach. Through SEM, future research efforts can better test the accuracy of the TAI conceptual model as a whole, instead of examining

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relationships between subsets of variables. SEM could also add insight in terms of measurement of each contributing construct, including engagement. Therefore, actual data applications of TAI can be tested in terms of how well raw data map onto the conceptual model. Follow-up questions could address the extent to which the hypothesized model is invariant or stable across groups. For example, does the model differ for male and female youth, or do different predictors matter more strongly for males while others matter more strongly for females? We could also test whether mediating paths differ between groups of individuals such as prior regular, infrequent, or non-substance users.

Latent Class Analysis/Latent Transition Analysis

Latent class analysis (LCA) is a statistical method with the goal of identifying mutually exclusive and exhaustive subgroups of individuals within a data set, based on participants' pattern of responses to observed categorical items (Lanza, Collins, Lemmon, & Schafer, 2007). LCA falls under the umbrella of person-centered techniques because of its focus on identifying types or subgroups of people that are qualitatively different, as opposed to variable-centered techniques that focus on understanding relationships between variables and make the assumption that such relationships are the same for all people (Collins & Lanza, 2010). One of the beneficial aspects of LCA is its ability to distinguish and describe types of individuals using complex sets of variables. Examples include data that capture multilevel risk factors (i.e., individual, family, school, neighborhood) for future behavioral problems in children (Lanza, Rhoades, Nix, Greenburg, & the Conduct Problems Prevention Research Group, 2010) or multiple indicators of substance use among college students (Evans-Polce, Lanza, & Maggs, 2016). Models that specify a given number of latent classes, or subgroups, are compared to determine the number of classes that best describe the data, using fit indices (i.e., Akaiki information criteria [AIC] and Bayesian information criteria [BIC]) and interpretability as a guide (Collins & Lanza, 2010). Model parameters offer an understanding of the overall probability of membership in each class, as well as the probabilities of responses for each individual item included in the analysis (Collins & Lanza, 2010). The former gives insight as to the distribution of the latent classes, or prevalence of each subgroup (Lanza et al., 2010); the latter parameters aid in the interpretation of each latent class. That is, by understanding how likely members in each class are to respond to a set of items, researchers can identify the patterns that exist within those classes (Collins & Lanza, 2010). Advanced LCA models go beyond identifying and describing latent classes to predicting class membership by including covariates and multigroup LCA, which allows for a comparison of the model across different populations (Collins & Lanza, 2010). If longitudinal data are available, it is also possible to examine transitions in latent classes

over time, a technique known as Latent Transition Analysis, or LTA (Collins & Lanza, 2010). One example would be to see if an intervention moves people from a high risk/risky behavior class to lower risk/less risky behavior classes.

LCA and LTA have become increasingly popular in social science research over the past decade and application of these models could serve to expand research in the area of health communication and NET and TAI interventions. If we again consider TAI, which posits changes in behavior after intervention via changes in knowledge, skills, expectancies and norms, the application of LCA allows for an examination of the following research question: Are there subgroups of adolescents who share distinct patterns of knowledge, skills, and expectancies (i.e., core TAI constructs)? Using this technique, the number of subgroups that exists using indicators of TAI constructs could be determined and then interpreted through an examination of the response probabilities. If multiple, distinct groups are observed, researchers could consider developing tailored interventions that address these differences (e.g., varying levels of baseline knowledge, skills, expectancies, and norms). Alternatively, within the treatment group for a given intervention (e.g., REAL media), we could address questions such as this: Are levels of engagement and reflection in treatment group participants related to their baseline latent class membership core TAI constructs?

Multilevel Analysis

Multilevel analysis (MLA) is a technique to analyze data that are hierarchical, or nested, in structure (Hox, 2002; Snijders & Bosker, 1999). Some examples of nested data structures include a sample of schools, and the students within those schools, or families, and the children within those families. Both of these examples would be considered two-level data structures, although it is certainly possible to have more levels of nesting such as accounting for classroom within a school. Another example of nested data includes repeated measures data in which multiple data points, or observations, are nested within individuals. Many statistical analyses are built on the assumption that the data are independent—that is, that person A is just as likely to be different from person B as they are from person C. However, this assumption cannot be made in nested data structures (Hox, 2002; Snijders & Bosker, 1999). That is, observations from students in the same school are likely to be more similar to one another than observations from children in different schools, just as children within the same family are likely to be more similar to one another than children from different families. Similarly, observations within the same individual over time are likely to be more similar to one another than observations between individuals over time. Thus, at the most basic level, multilevel analysis offers the ability to account for the potential dependence that exists as a result of nesting and, in turn, to obtain more accurate standard error estimates. Beyond that, multilevel analysis offers an opportunity to examine predictors at each level, as well as interactions across levels, which is particularly relevant for studying outcomes that are influenced at multiple

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levels (e.g., individual, family, community, society). The intraclass correlation (ICC) is a measure of the proportion of the variance in the outcome of interest that can be accounted for by the nesting and helps to determine whether a multilevel analysis is necessary.

The application of MLA is particularly relevant for the examples of NET and TAI interventions described throughout this article because these interventions are designed for wide-scale implementation in schools or organizations that lend themselves to nested structures. For example, REAL media was designed for delivery in 4-H clubs, which yields, at minimum, a two-level data structure with 4-H members nested within clubs. Taken one step further, those clubs could be further nested within county, state, and/or region. Similarly, *keepin' it REAL* is delivered in schools across the country, requiring the need to examine the impact while considering students nested within classrooms within schools, and again perhaps even states, region, or some other higher level variable. Beyond using MLA to accurately estimate the effect of these programs on the outcome of interest (e.g., indicators of substance use), we can address questions such as the following: What characteristics of 4-H clubs/classrooms predict lower levels of substance use?

Conclusion

This article discusses Active Involvement as a strategy for health promotion, particularly in the case of adolescent substance use prevention. As technology advances and access is increasingly available for the production and dissemination of messages, AI in health campaigns de facto becomes more common. Campaigns such as Monday Campaigns (http://www.mondaycampaigns.org/) and the truth® initiative are increasingly reliant on this type of strategy. Thus, it behooves health scientists to provide theories and models for effective implementation, including but not limited to testing components and pathways of change. The discussion of AI interventions, theories, and processes, of course, is ongoing, and we invite the reader's active engagement in the process and contributions to this emerging area.

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Kathryn Greene

Department of Communication, Rutgers University

Smita C. Banerjee

Department of Psychiatry and Behavioral Sciences, Memorial Sloan-Kettering Cancer Center

Anne E. Ray

REAL Prevention, LLC

Michael L. Hecht

REAL Prevention, LLC

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