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Integrating mental health into adolescent annual visits: Impact of Pre-Visit Comprehensive Screening on within-visit processes

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Abstract

Purpose—To evaluate how a comprehensive computerized, self-administered adolescent screener, the *DartScreen,* affects within-visit patient-doctor interactions such as data gathering, advice giving, counseling, and discussion of mental health issues.

Methods—Patient-doctor interaction was compared between visits without screening and those with the *DartScreen* completed before the visit. Teens, ages 15–19 scheduled for an annual visit, were recruited at one urban and one rural pediatric primary care clinic. The doctor acted as his/her own control, first using his/her usual routine for 5 to 6 adolescent annual visits. Then the *DartScreen* was introduced for five visits where at the beginning of the visit, the doctor received a summary report of the screening results. All visits were audio-recorded and analyzed using the Roter Interaction Analysis System (RIAS). Doctor and teen dialogue and topics discussed were compared between the two groups.

Results—Seven mid-career doctors and 72 adolescents participated; 37 visits without *DartScreen* and 35 with *DartScreen* were audio-recorded. RIAS defined medically related data gathering (mean 36.8 vs. 32.7 statements, p=0.03 and counseling (mean 36.8 vs. 32.7 statements, p=0.01) decreased with *DartScreen*; however doctor responsiveness and engagement improved with *DartScreen* (mean 4.8 vs.5.1 statements, p=0.00). Teens completing the *DartScreen* offered more psychosocial information (mean 18.5 vs.10.6 statements, p=0.01) and mental health was discussed more after the *DartScreen* (93.7 vs. 43.5 statements, p =0.03). Discussion of somatic

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and substance abuse topics did not change. Doctors reported screening improved visit organization and efficiency.

Conclusions—Use of the screener increased discussion of mental health but not at the expense of other adolescent health topics.

Keywords

adolescent; pre-visit computerized screening; patient-doctor interactions; mental health screening

Adolescent preventive care presents the primary care provider (PCP) with a broad psychosocial and somatic agenda[1] that challenges the PCP to efficiently balance attention to physical and mental health.[2] Several studies have documented the lack of screening and counseling of adolescents during annual visits, particularly for sensitive topics such as depression, reproductive health and/or weight.[234567]Although asking open ended questions can lead to greater coverage of recommended annual visit topics, [8] use of pre-visit screening is a potential solution to managing the broad agenda of addressing several adolescent risk behaviors. Pre-visit screening allows the PCP to review a summary of concerns, issues, and pertinent positives at the beginning of the visit, and thus potentially facilitate a shift from the PCP asking questions during the visit to discussion and counseling about relevant adolescent health issues, including mental health. This shift could be a mechanism for how pre-visit screening can increase PCP patient centeredness.[9]

Although research on pre-visit computerized screening is relatively new, there is emerging evidence that both patients and PCPs respond positively. PCPs have reported screening to be both acceptable and useful, and they perceive parents and patients to be more satisfied than dissatisfied with screening. [101112] Computerized screening is advantageous for taking less time and eliminating the need for paper and hand scoring of results.[1011] It is a feasible way of increasing identification of pediatric mental health concerns.[1013141516] Adolescents in particular appear to be more comfortable reporting personal information to a computer than a person.[1417181920] More adolescents thought their visits were confidential, felt they were listened to carefully (84% vs. 65%), and were more satisfied (88% vs. 63%) when computerized screening was used compared to when it was not.[21]

There is little information, however, about how screening affects within-visit patient-doctor processes such as engagement, data gathering, counseling, advice, and discussion of sensitive issues. Because adolescents are more likely to disclose their concerns on a computerized screener suggests that the use of the screener may help validate adolescents' concerns, help them feel comfortable raising sensitive issues, and help them realize that their doctor is interested in discussing these. Improvement in these areas could help the PCP understand the teen's concerns, engage them in plans to address their concerns, and adherence to the treatment plan.

Our work with younger patients, age 4–11 years, showed that comprehensive pre-visit screening completed by parents facilitated agenda setting, enhanced engagement, and promoted discussion of mental health issues during well child visits.[16] Screening was well

accepted by both parents and PCPs. However, it is unknown whether these benefits will generalize to the adolescents who present a broader agenda.

The overall goal of this study was to better understand how PCPs use a comprehensive pre-visit web-based screen during annual visits with adolescents and to assess the impact of screening on the within-the-visit processes of problem assessment, patient engagement, and PCP counseling. Using audio-recorded observations of annual visits, we examined the dialogue between pediatricians and adolescent patients, and the content of information exchanged without and with use of a pre-visit screener. We hypothesized that the screener would shift the communication focus from data gathering to counseling the teen and increase discussion of sensitive issues, including mental health.

Methods

Study Design

This was a quasi-experimental study to observe how pediatric PCPs and adolescents use pre-visit comprehensive screeners during annual visits. We compared two study groups in which the doctor acted as his/her own control. To avoid contamination, 37 usual care visits (7 PCPs with 5–6 patient visits) were recorded before introducing *DartScreen*. Participating PCPs used his/her usual routine for annual visits, which did not include a pre-visit screener or other formal screening tools. This was followed by recording 35 annual visits (same 7 PCPs) with adolescents who completed the *DartScreen* before the visit.

Setting

Two pediatric primary care sites (one urban and one rural) were included. Bassett Pediatric clinic is a general pediatric practice in a rural health network in upstate NY. The East Baltimore Medical Center houses a pediatric clinic in the Johns Hopkins Community Physicians urban network in Baltimore, MD. Adolescents ages 15–19 who were being seen by a doctor for an annual visit were eligible for recruitment.

Intervention

The tablet-based screener, *DartScreen*, was based on the GAPS model[22] and modified based on recommendations from the Clinicians Enhancing Child Health network.[14] Two unique computerized, self-administered screeners had been developed by two coauthors (ALO, ZJN), one for 11–14 year olds and one for 15–19 year olds. Older teens were selected for this study as they are more likely to have a positive screen. Each screener has 60–65 core questions which can branch to up to 94 total questions. Nine adolescent health domains were the focus of this study: nutrition, exercise, school, safety, reproductive health, drugs, alcohol, tobacco, and psychosocial (depression, anxiety, and mental health). Mental health screeners incorporated into the *DartScreen*[23] include Patient Health Questionnaire (PHQ),[2425] General Anxiety Disorder (GAD-2) [26] and Suicide Behaviors Questionnaire (SBQ).[27] Branching logic allows additional questions to be asked if risk was present and to assess it more in-depth. Examples include screens for depression, i.e. if the PHQ-2 screen was positive, the screener branched to the PHQ-9. If the two NIAAA[1] screening questions

for alcohol use by friends or the teen were positive, the screener branched to the six-question CRAFFT[2] screen for alcohol and other drug-related problems.[28]

For visits with the *DartScreen*, the teen was asked to complete the screener using an *iPad* in the exam room before the annual visit started. Teens were instructed to complete the screen on their own. At the beginning of the visit, the PCP was given the *iPad* displaying a summary of *DartScreen* results including color highlighted pertinent negative and positive responses to each screening question.

Teens (and parents if teens were under age 18) were recruited consecutively and consented for study by research assistants. The participation rate was 87% (72/83), with 11 teens refusing because they had sensitive issues to discuss or did not want to participate in a study. Based on prior studies, a sample size of 34 per group was sufficient to detect a difference of 24% in one or more Roter Interaction Analysis System (RIAS) variables, assuming a standard deviation of 19 points, a power of 80%, and a significance level of 5%.

Following informed consent, all visits were audio-recorded starting when the PCP entered the room and ending when the PCP exited. All participating teens were asked to fill out a 3-minute exit survey at the end of their visit with the PCP. The survey included whether the teen felt encouraged to talk about concerns or issues and were they listened to, did the doctor address their concerns, and if so, how. The teen received a $20 gift card after completing the exit survey. This study was approved by the IRB at the Johns Hopkins Bloomberg School of Hygiene and Public Health and Mary Imogene Bassett Hospital.

PCP Interview Procedures

Once a PCP had completed their visits without and with the screener, they were interviewed by telephone to learn more about their experience with *DartScreen*. A semi-structured interview included questions on the PCP's thoughts on the screener content and format, and the PCP's perspective on how the screener affected assessment, agenda setting, interaction with adolescents and parents, treatment planning, and visit efficiency.

Each interview was audio-recorded and transcribed, and inductive thematic analysis was used to identify themes in the data. Two coders coded the transcripts by hand. They identified passages that related to the acceptability (e.g., content, format) and impact of the screener (e.g., on disclosure, engagement), and developed a consensus about the emerging themes.

Audio-recording analysis

Audio-recordings were de-identified after the visit and coded with RIAS, a widely used system for characterizing medical dialogue with well-established reliability and predictive validity.[29] The unit of analysis is a statement conveying a complete thought that may be communicated as a single word, simple sentence, or a clause in complex sentence.

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[1]National Institute on Alcohol Abuse and Alcoholism

[2]CRAFFT is a mnemonic acronym of first letters of key words in the 6 screening questions (CAR, RELAX, ALONE, FORGET, FRIENDS, TROUBLE) for adolescents aged 14 and older. See Knight 1999.

Statements are coded directly (digitally tagged) on the recordings without transcription and assigned to one of 37 mutually exclusive and exhaustive code categories. The RIAS code categories capture behaviors such as giving information, asking questions, and counseling across content areas, including biomedical (i.e. medical symptoms and history, current treatment, including medication, tests and other procedures, and appointments), psychosocial and lifestyle (i.e. living situation, family relations, and functions related to daily living or emotional states like stress, depression, or anxiety, lifestyle and habits of daily living) as well as partnering and activation (i.e. active cues of interest, paraphrase and interpretation, and checking understanding), socio-emotional categories (i.e. positive, negative, and social exchanges), as well as statements indicative of emotional responsiveness (i.e. empathy, reassurance, concerns). [293031]

Specific PCP tasks, i.e. agenda setting, prioritizing needs, decision making, teach-back, and PCP reference to screener, were coded separately. Content areas were also specified for the nine adolescent health domains included in the *DartScreen.* To assess whether a topic was addressed or not during the visit, the type of information exchanged was 'blocked' into RIAS topics that match the nine *DartScreen* domains. Nutrition, exercise, and reproductive health were also combined as a somatic composite; tobacco, alcohol and other drugs were combined as a substance abuse composite. Mental health and school performance comprised the psychosocial composite.

Because it was not unusual for the PCP to leave the room during the course of a visit, visit length was defined as face to face time.

Analysis

Visits with and without *DartScreen* were compared using the following RIAS variables: RIAS-defined PCP and teen talk, binary outcome of whether a topic was addressed during the visit, a summative comparison of mean statements per visit applied to RIAS categories, somatic, substance abuse, mental health topics, and visit length. Generalized linear regression analysis with generalized estimating equations was used to assess the effect of using the screener while adjusting for the nesting of patients within doctors, and for visit length, adolescent age, and gender. Adjusted group means, standard errors, and p values were estimated using the delta method in STATA version 12.

Because positive screens may increase the length and/or content of the visit, visit length was compared with the number of *DartScreen* domains the adolescent positively endorsed. In addition, because the *DartScreen* branches to additional questions if the initial question is positive, scores for each question within a screening domain were summed to create a score for that domain. Pearson's correlation was used to assess whether a positive score for a *DartScreen* domain was associated with the corresponding RIAS-defined content talk related to that domain. Because PHQ-2 is sometimes used alone as a screener, the correlation of PHQ-2 scores as well as PHQ-9 scores with RIAS psychosocial topic was examined. The correlation between the *DartScreen* total score and the total number of RIAS topics discussed during the visit was also analyzed.

Results

This study included seven mid-career PCPs and 72 visits: 37 visits without the screener and 35 with the screener. The mean age for PCPs was 48 years, and they were 71% female, 50% urban, 57% Caucasian, 100% pediatricians.

Adolescent study participants were mostly female (Table 1). The *Dartscreen* was completed on average in 9.5 minutes. There were no significant differences between the characteristics of the adolescents who were screened and not screened. Exit survey results were also similar between those screened and not screened. Because most adolescents who were not screened were very satisfied after the visit, ceiling effects precluded demonstrating improvement in patient satisfaction.

Mean visit length tended to be longer among adolescents who completed the screener (25 vs. 29 minutes), but this difference was not statistically significant (p=0.11).

Specific PCP tasks, i.e. agenda setting, prioritizing needs, decision making, and teach-back, did not differ significantly with or without screening. RIAS results for PCP data gathering show a reduction in questions about medical conditions (mean 36.8 statements without screen vs. mean 32.7 statements with screen), but no change in questions about psychosocial issues. While we expected the number of closed questions to decrease in the screened condition because the screener is fairly comprehensive, we did not find a significant decrease (6.5 without vs. 8.6 with screening). A review of 10 audiotapes in the screened group showed that PCPs used the *DartScreen* responses to probe further, ask clarifying questions, and do a more in-depth assessment about positive screens.

In terms of PCP counseling, there was a reduction in giving therapeutic information for medical conditions (mean 24.9 statements with screening vs. 39.2 statements without, p=0.005), and a marginal increase in PCP counseling on psychosocial information (mean 7.3 statements with screener vs. 3.7 without, p=0.06). Ratings of PCP affect in terms of interest, attentiveness, responsiveness, and engagement significantly increased in the screening condition (See Table 2).

Teens engaged in significantly more psychosocial dialogue and offered more psychosocial information after completing the *DartScreen* (mean 18.5 statements with screening vs.10.6 without screen, p =0.01) (Table 2). Teen talk about medical conditions did not change significantly, nor did ratings of teen affect.

Regarding topics addressed during the visit, mental health was discussed significantly more in the screened condition (mean 93.7statements per visit with screener vs. 45.3 without screener, p =0.03) (Table 3). Somatic and substance abuse composites for topics addressed show no significant difference between visits with and without the *DartScreen*.

For the 35 adolescents who completed the *DartScreen*, the most frequent positive screens were: nutrition (86%), exercise (43%), safety (31%), drugs (23%), alcohol (17%), depression (17%), anxiety (14%), tobacco (14%), school problems (11%). For mental health, there were 10 teens with a positive PHQ-2, among whom six also had a positive

PHQ-9. Five anxiety screens were positive, among which three were also positive for PHQ-9.

The composite *DartScreen* score was significantly correlated with the number of RIAS content areas addressed during the visit (Pearson's r = .57, p <0.000) and with length of the visit (Pearson's r = .53, p =0.001) (Table 4). Positive screens in exercise, school, tobacco, drugs, reproductive health, and mental health risk behaviors were significantly correlated with the corresponding RIAS content areas. However, nutrition, alcohol, safety and injury prevention were not. Both the PHQ-2 and PHQ-9 score were significantly correlated with discussion of psychosocial issues.

PCP Interviews

PCPs reported that the screener helped with setting the agenda for the visit and improved visit efficiency. Specifically, they noted that the screener helped identify issues, particularly sensitive topics that might not come up without a screener (Table 5). They pointed out, however, that discussing positive screening items was critical for learning more about the problem and making sure it was a real concern. Screening improved efficiency by reducing the number of questions asked in the visit and allowing more time for discussion. A few PCPs noted that the screener added time to the visit, but they felt this was worthwhile because important issues were uncovered that needed to be discussed. Most PCPs did not think the screener specifically affected treatment planning.

Discussion

Pre-visit screening facilitates comprehensive risk assessment by the PCP by obviating the need to ask about each adolescent risk behavior or any health concern during the visit. This study suggests that pre-visit screening that incorporates mental health screeners appears to allow the teen to talk more during the visit, specifically about psychosocial issues.

Although we found an increase in the amount of teen talk on psychosocial issues and a general increase in the discussion of mental health, we did not find a significant increase in visit time. This may be due to the corresponding reduction in PCP talk about medical conditions. Together, these findings suggest that use of a screener allows for a shift of focus to psychosocial topics, which are likely to be of more concern to teens given that adolescence is a time of significant social and emotional development. That said, there are teens who will have both medical and mental health concerns, and no doubt PCPs will spend more time with these teens. In other studies, pediatric visit length increased by 5 minutes when behavioral concerns were raised.[3233] Including mental health questions in a pre-visit screener may have an important function of stimulating PCP discussion of mental health issues with the adolescent, but may also increase visit time.

In a prior study, we found that pre-visit screening of younger children can identify caregiver needs and priorities, facilitate communication, and prepare the PCP, patient and parent for a well visit.[16] In this study, RIAS analysis suggests that screening operates as a patient activation tool as it appears to enhance discussion and teen talk. PCPs may have been activated as well as they were rated as more engaged and attentive in the screening condition

which supports the notion that PCPs were focusing in a different way when they had screening results in hand. PCPs reported that they felt the screener helped to organize the visits, ask fewer questions, and focus more on issues of concern to patients, thereby making the visit more efficient overall. PCPs acknowledged that when the screener did identify certain issues the visit was longer, but the benefit of uncovering a problem outweighed the cost of time.

The questions the PCPs ask in the not screened condition may be more exploratory and in line with the traditional notion of "data gathering," whereas the questions asked in the screened condition may be more explanatory and more in line with "probing and discussing concerns." So while questions continue to be asked after screening, they may be qualitatively different.

For adolescents who were screened, there was a high correlation between positive *DartScreen* topics and the RIAS content areas addressed during the visit. The exceptions include screening for alcohol, nutrition, and safety, where there is no correlation between a positive screen and PCP discussion of these topics. Other studies have documented that having a risk factor was strongly associated with PCP counseling for depression and reproductive health, less so for other topics.[2] Screening for alcohol use among high school students may not enhance discussion of alcohol use or interest in changing behavior, nor is there an evidence base to guide PCPs in how they should intervene when alcohol or drug misuse is identified.[34] Discussion of safety issues may be low in both groups because teens have little interest in injury prevention. On the other hand, PCPs appear to routinely discuss nutrition (diet and weight status) given the contemporary emphasis on BMI measurement and obesity prevention in primary care.[3]

Limitations of this study include that the sample was non-random. However it did take place in community clinics, as opposed to research or training settings. Results need to be duplicated in other cultures as well as demographic and geographic regions. Increased discussion of RIAS content areas could be attributed to the Hawthorne effect because the visits were audio-recorded. While it is true that recorded visits may capture "best behavior," this bias would likely be evenly distributed pre- and post-*DartScreen*, and if it had any impact, it would be to minimize the difference we have detected. A study in which clinicians who were and were not informed that visit recordings were being made, addressed the association between performance bias and observation by comparing these visit recordings. No statistically significant difference in the number or nature of the problems discussed or visit length was found.[35] We were not able to distinguish between new and regular patients, so we could not account for differences in communication based on length of doctor-patient relationship. We cannot comment on how effectively the risk behaviors were addressed. RIAS can indicate what topic was addressed, but not how or how well the PCP responded to a positive screen. Also RIAS cannot distinguish between anticipatory guidance (routinely done) versus counseling (triggered by a positive screen). Future studies should attempt to differentiate the effects of screening on these PCP tasks.

Finally, while it is well documented that inadequate screening particularly for mental health occurs in primary care, [363738] we cannot estimate from this study what impact integration of

mental health screening will have on recognition and timely treatment of mental disorders. Although there was more discussion of psychosocial issues associated with screening in this study, we could not delineate any connection between increase in discussion of mental health issues and its clinical benefit.[39]

This study is significant because it examines how pre-visit screening affects within visit processes occurring during the adolescent annual visit. Although developmental and behavioral screening is widely recommended and considered a priority,[40] this study challenges assumptions about what screening does or leads to in terms of PCP behavior. It is not known whether increased discussion of mental health prompts the PCP to do something when indicated. The next stage of research, apart from replication in other settings, is testing how to facilitate timely intervention by the PCP in order to improve mental health outcomes.

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Abbreviations

PCP primary care providers

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Implications and Contribution

Use of a comprehensive computerized screener before annual visits may increase teen disclosure and doctor patient discussion of mental health problems, and therefore aid in the recognition and discussion of mental health issues in primary care settings. Further research is needed to determine whether these effects lead to effective intervention.

Table 1

Characteristics of adolescents included in the study and their exit survey responses, stratified by screening status. N= 72.

Measures	Without DartScreen (n=37)	With DartScreen (n=35)	p value
Mean age (SD)	16.4 (1.4)	16.7 (1.4)	0.45
% Female	70.3%	65.7%	0.44
% Parent not present	40.5%	54.3%	0.43
% Caucasian	48.6%	48.6%	0.57
% Urban	51.4%	51.4%	0.59
% Felt major concerns addressed (strongly agree)	48.6%	48.6%	0.21
% Identified new concerns not thought of before visit	51.4%	37.1%	0.39
% Encouraged to talk about concerns or issues (strongly agree)	56.8%	48.6%	0.50
% Doctor listened very carefully	94.6%	82.9%	0.25
When concerns were raised (n = 54), what did Doctor do to address concerns discussed during visit?			
Had no concerns	18.9% (n=7)	17.1% (n=6)	0.54
Gave advice	78.4%	71.4%	0.34
Gave written materials	21.6%	14.3%	0.31
Helped make a plan about what to do next	56.8%	42.9%	0.17
Made a referral	21.6%	11.4%	0.20
Prescribed a medicine	29.7%	22.9%	0.35
Requested follow up visits	13.5%	8.6%	0.39
Did not do anything to address concerns	2.7%	0	0.51

Table 2

RIAS code categories: Summed score and mean number of statements by PCPs and adolescents during visits with and without use of *DartScreen*, N= 72.

	Mean Number of statements		
RIAS code categories (bold) ***Category component (indent)@***	***Without DartScreen (SE) (n=37)***	***With DartScreen (SE) (n=35)***	**p value***
Primary Care Providers (PCP)			
PCP Data Gathering re: psychosocial questions	48.7 (4.9)	48.6 (6.8)	0.99
Open lifestyle question	10.5 (1.7)	9.0 (1.6)	0.20
Open psychosocial question	4.4 (0.8)	4.5 (0.9)	0.93
Closed lifestyle question	27.1 (9.5)	26.3 (3.4)	0.81
Closed psychosocial question	6.5 (0.6)	8.6 (1.6)	0.10
PCP Data Gathering re: medical questions	36.8 (2.4)	32.7 (2.4)	0.001
Open medical question	8.3 (2.0)	6.9 (1.1)	0.27
Open therapeutic question	1.8 (0.2)	1.7 (0.4)	0.84
Closed medical question	20.7 (2.1)	18.5 (1.9)	0.14
Closed therapeutic question	6.2 (1.3)	5.8 (0.9)	0.59
PCP Information and counseling re: psychosocial	54.7 (9.3)	58.4 (9.2)	0.72
Gives lifestyle information	14.5 (4.2)	13.6 (1.9)	0.75
Gives psychosocial information	3.7 (1.3)	7.3 (1.3)	0.06
Psychosocial counseling	36.3 (4.5)	36.9 (8.1)	0.94
PCP Information and counseling re: medical treatment	82.7 (11.6)	61.3 (8.2)	0.003
Gives medical information	27.0 (4.5)	22.8 (2.9)	0.07
Gives therapeutic information	39.2 (6.3)	24.9 (3.7)	0.005
Medical/therapeutic counseling	16.7 (2.5)	13.6 (2.5)	0.11
PCP Partnership	108.1 (11.7)	105.6 (9.6)	0.62
Partnership	0.6 (0.2)	0.4 (0.2)	0.21
Checks for understanding	32.4 (3.7)	32.9 (2.1)	0.85
Asks for understanding	13.0 (2.9)	10.9 (2.9)	0.10
Asks opinion	5.4 (0.8)	5.5 (1.1)	0.95
Shows agreement	56.7 (6.5)	55.9 (5.5)	0.80
PCP Rapport	121.1 (7.6)	123.8 (6.9)	0.59
Rapport positive	81.2 (5.1)	80.7 (3.7)	0.85
Rapport emotional	35.4 (6.8)	38.0 (7.1)	0.39
Rapport negative	1.5 (0.6)	1.7 (0.5)	0.73
Rapport social	2.6 (0.9)	3.1 (0.8)	0.55
PCP Patient Centeredness	1.4 (0.1)	1.8 (0.3)	0.21
PCP Hurried/rushed	3.0 (0.2)	2.9 (0.2)	0.69
PCP Responsiveness/engagement	4.8 (0.1)	5.1 (0.0)	0.00
PCP Interest/attentiveness	4.8 (0.1)	5.0 (0.0)	0.00

	Mean Number of statements		
RIAS code categories (bold) ***Category component (indent)***[@]	***Without DartScreen (SE) (n=37)***	***With DartScreen (SE) (n=35)***	**p value**[*]
Adolescent patients			
Teen Talk re: psychosocial and lifestyle issues	62.1 (4.9)	75.2 (3.6)	0.06
Gives psychosocial information	10.6 (1.4)	18.5 (2.8)	0.01
Gives lifestyle information	52.1 (4.2)	56.9 (4.2)	0.46
Teen Talk re: medical and treatment	42.3 (3.8)	50.8 (2.2)	0.08
Gives medical information	32.4 (2.9)	38.5 (2.0)	0.10
Gives therapeutic information	9.8 (1.7)	11.6 (2.0)	0.50
Teen Interest/attentiveness	3.7 (0.2)	3.6 (0.2)	0.13
Teen Responsiveness/engagement	3.5 (0.1)	3.6 (0.2)	0.74

[*] Scores are adjusted for nesting of patients within provider, length of visit, adolescent age and gender.

[@] RIAS category scores are the sum of the indented component scores listed below the category.

Table 3

Mean number of statements related to adolescent health topics addressed during annual visit without and with *DartScreen*, N= 72.

Adolescent Health Topics Addressed	Without DartScreen (n=37)	With DartScreen (n=35)	p value*
Nutrition	50.8 (7.9)	43.3 (7.4)	0.55
Exercise	16.5 (3.0)	20.0 (4.2)	0.51
School	57.2 (10.2)	44.5 (8.7)	0.15
Safety	12.5 (7.8)	15.9 (4.9)	0.62
Tobacco	12.9 (1.7)	16.0 (4.6)	0.43
Alcohol	9.5 (4.1)	10.9 (3.3)	0.58
Drugs	12.4 (2.8)	11.8 (2.7)	0.49
Reproductive	93.7 (15.7)	69.5 (5.7)	0.20
Mental	45.3 (10.6)	93.7 (11.7)	0.03
Sum of all topics	307.3 (14.7)	323.7 (14.0)	0.50

*Scores are adjusted for nesting of patients within provider, length of visit, adolescent age and gender.

Table 4

Correlation between *DartScreen* positive screens and RIAS content areas for adolescents who completed the screener. N= 35

Adolescent health topic	Pearson Correlation Coefficient	p value
Nutrition	.118	0.50
Exercise	.362	0.03
School	.359	0.03
Safety/Injury prevention	.329	0.05
Tobacco	.478	0.004
Alcohol	.152	0.39
Drugs	.378	0.02
Reproductive health	.425	0.01
Mental health (PHQ-2)	.592	0.00
Mental health (PHQ-9)	.401	0.02
All positive items on *Dart Screen*[@] and # of RIAS topics	.571	0.00
All positive items on *Dart Screen*[@] and visit length	.532	0.001

[@]All positive items on *DartScreen* is the sum of all the *DartScreen* category scores (excluding Health Concerns).

Table 5

Representative quotes from PCPs regarding use of the *DartScreen*

Domain	Quote
Disclosure	PCP 15: Some people either don't want you to know or they repress things that may be significant. So the screener helps. PCP21: I think it helped. …I think I actually ended up identifying two kids that were depressed that I would not have thought they were depressed. Normally they can cover it up better. They didn't want to lie to the screener so these answers came out. PCP17: If I ask openly, sometimes I get nothing. If you ask specific questions on screener, it's more likely to get an answer. PCP16: It helped to pull out the issues. When you ask in person, you get monotone answers, but the screener helps them open up.
Increased discussion time	PCP22: The teens do it in advance and then you explore the positives. This gives more time for discussion.
Efficiency	PCP21: To get some background on more things to focus on was a little bit more useful, and then I didn't have to ask a whole lot of other questions because they just answered them. …. I think that's the point of using the screener: to save us time. PCP17: I was pleasantly surprised—it was a time saver. I could jump to the discussion without data gathering.