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Using Body Mass Index to Identify Overweight Children: Barriers and Facilitators in Primary Care

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Abstract

Background—Overweight is an increasingly prevalent pediatric health problem but is under-diagnosed. Despite recommendations endorsing the use of body mass index (BMI) to identify overweight children, clinicians seldom use BMI. Barriers to the use of BMI in pediatric primary care have not previously been described.

Objective—Use qualitative data to determine providers': 1) familiarity with and attitudes toward recommendations for identifying overweight children and 2) perceived barriers and facilitators to use of BMI.

Methods—We conducted six focus groups involving a total of 38 providers (pediatricians, family physicians, physician assistants, and nurse practitioners) in private practices (n=3), academic medical centers (n=2), and a community health center (n=1).

Results—Providers described lack of familiarity and agreement with BMI screening recommendations and skepticism about treatment effectiveness. Reported practice-level barriers to BMI use included lack of access to BMI charts and accurate height/weight data. In one practice, providers used an electronic medical record (EMR) system that automatically included BMI and described this EMR as a facilitator of BMI use.

Conclusions—Practice-level changes such as incorporating BMI into office systems and EMRs may be needed to support pediatric primary care providers in using BMI routinely. To increase use of BMI and early identification of overweight, educational interventions that address individual providers' concerns about screening recommendations and treatment effectiveness may also be necessary.

Keywords

Overweight; children; pediatrician; body mass index

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INTRODUCTION

Because overweight continues to increase and affects approximately 16% of U.S. children and adolescents,¹ it is one of the most prevalent chronic conditions facing pediatric primary care providers. Left untreated, childhood overweight is associated with health problems including hypertension, dyslipidemia, type 2 diabetes and sleep apnea,² and an increased risk of obesity in adulthood³. Pediatric primary care providers have face-to-face encounters with families at regular intervals and deliver preventive health care and anticipatory guidance on a range of topics to promote children's health and wellbeing⁴. Because of their ability to counsel and make referrals, pediatric primary care providers are well positioned to help avert overweight and its complications through prevention, early identification, and treatment.

Recognizing the potentially important role of pediatric primary care providers in addressing the national epidemic of childhood overweight, leading public health agencies have developed recommendations for identifying overweight children. In 2000, the Centers for Disease Control and Prevention (CDC) recommended use of body mass index (BMI) to describe the weight status of children and adolescents, designating BMI $\geq 95\%$ as "overweight" and BMI $\geq 85\%$ as "at risk for overweight"⁵. Revised growth charts⁶ and clinician training materials⁷ accompanied these recommendations. Subsequently, an American Academy of Pediatrics (AAP) policy statement recommended annual calculation of BMI as part of routine preventive health care for children and adolescents⁸.

Despite these recommendations, there is evidence that overweight is under-diagnosed in pediatric primary care encounters and that BMI is rarely used to identify overweight. We previously conducted a statewide survey of pediatricians, only 11% of whom reported always using BMI to determine if a child is overweight⁹. Other researchers who used chart reviews found that only 20-53% of overweight children had documentation of overweight in the medical record¹⁰⁻¹³. Parent reports of encounters with children's health professionals verify that overweight is not only under-identified but infrequently discussed. National survey data indicate that only roughly a third (37%) of overweight children and their parents report having been told by a healthcare professional that the child was overweight¹⁴. BMI charts may more effectively flag excess weight for height and spark concern for consequences than do conventional weight and height charts as we demonstrated previously⁹.

Given indications that the identification, documentation, and discussion of overweight are less than optimal, studies are needed that provide insight into why pediatric primary care providers rarely use BMI or document a diagnosis of overweight. To determine how to best support pediatric primary care providers in incorporating prevention, early identification, and management of overweight into routine preventive healthcare, a detailed understanding of the barriers to identifying overweight children is needed. We designed a focus group study to elicit pediatric primary care providers' perspectives on the identification of childhood overweight. We sought to determine: 1) pediatric primary care providers' attitudes toward recommendations from the CDC and AAP regarding identification of overweight, and 2) barriers and facilitators to use of BMI.

METHODS

Study Design

Focus groups are a useful method of understanding motivations and behavior¹⁵ and obtaining in-depth information on perceived barriers. To elicit information from a range of pediatric primary care providers and ensure sufficient numbers of participants in each group, we identified central North Carolina practices with at least 6 clinicians that provided primary care to children. We approached two primarily pediatrician-staffed private practices, one practice

consisting primarily of family physicians, two academic medical center practices, and a community health center. We contacted the lead physician for each group; all six practices agreed to permit us to invite clinicians to an approximately 60-minute lunchtime focus group. Practices were located in 5 small- to medium-size towns and on average were 40 miles from a major metropolitan area (range 18-70 miles). Due to distance between practices, each focus group included practice-specific clinicians. Focus group times were established well in advance so clinic schedules could be adjusted. Participants were seated, provided with lunch, and doors were closed to minimize interruptions. Due to variation in time required to seat and orient participants, actual focus group lengths ranged from 50-73 minutes. Focus group participants signed informed consent and completed a brief demographic questionnaire. A general pediatrician (KBF or EMP) trained in focus group methodology and an assistant facilitated each group. Sessions were audiotaped and the assistant recorded notes about nonverbal communication. Participants were told that the purpose of the group was to discuss thoughts and opinions about childhood overweight, and we reviewed ground rules for focus group discussions¹⁶. The study was approved by the UNC School of Medicine Institutional Review Board.

Focus Group Questions

Based on participants' responses to a previous survey¹⁷ and review of the literature, we developed a focus group guide consisting of eleven key questions and probes (Table 1). Two general pediatricians, and other researchers with expertise in childhood obesity who were not part of subsequent focus groups, reviewed the content and language of the focus group guide for clarity and completeness.

Analysis

Audiotapes were transcribed in their entirety. We developed an initial set of codes based on close reading of the first transcript, adding codes as new themes emerged in additional transcripts. All six transcripts were then reviewed using the final set of codes. Two investigators (KBF and CIV) read and independently coded the transcripts, adjudicating differences in coding through discussion. For barriers to BMI use, inter-rater reliability of coding was 89% ($p < 0.01$ by Fisher's exact test).

A coding matrix was developed based on a previously developed taxonomy for understanding barriers to physician adherence to guidelines¹⁸. Where applicable, we grouped codes according to the barrier to which they corresponded: lack of familiarity with BMI, lack of agreement with recommendations to use BMI, skepticism about treatment effectiveness, or environmental factors. Two additional investigators (EMP and AA) reviewed final coding matrices for consistency and completeness. Coding and analysis were performed using Ethnograph 5.0 software¹⁹. In some cases, we also used Ethnograph to quantify percentages of participants endorsing comments. Recognizing that focus groups are not methodologically designed to elicit individual, privately held beliefs, inferences from the percentages should be interpreted with caution.

RESULTS

All six practices that were approached agreed to participate. Participating practices served a high percentage (40-90%) of patients receiving Medicaid.

Each focus group consisted of five to nine clinicians, for a total of 38 participants. Slightly less than half (47%) of participants were female, and mean time since completion of training was 13 years (range=1-35 years). Almost all participants (92%) were white. Most (87%) were board-certified physicians; the remaining participants were nurse practitioners or physician

assistants. Seventy-one percent of participants were trained in pediatrics or pediatrics/internal medicine, and the rest were trained in family medicine.

Use of BMI

Few focus group participants (29%) reported routinely using BMI to diagnose overweight in children (Table 2). Many (71%) stated that they relied on height and weight growth charts, used simple visual assessment (“eyeballing”), evaluated trends over time, or examined BMI only if concerned. In some instances, practicelevel characteristics were related to use of BMI. In one private practice, all participants who commented on BMI endorsed using it. This practice had been using an EMR system for one year which routinely calculated and graphed BMI at well-child visits. Respondents in this practice unanimously agreed that automatic BMI calculation facilitated using BMI; as one said, “It’s a vital sign now. ...It’s right there in the vitals section, whereas before you had to actually track it down. ...It just makes it more in the forefront, makes me more apt to discuss it”. Additionally, this practice was comprised of family physicians who, as several participants noted, had prior experience using BMI in adults.

Within the 5 remaining practices, participants varied considerably in their opinions about and use of BMI. These practices did not have EMRs or systems for practice-wide BMI calculation and had not developed within-practice consensus about routinely using BMI. One participant described the importance of practicelevel change, saying, “We haven’t made a special effort to tell the nurses ‘got to have a BMI on every single kid,’ which is probably a practice change we ought to make”. In addition, individual participants described multiple barriers to using BMI, as described below.

Barriers to Use of BMI

Identified barriers included a lack of familiarity with BMI, a lack of agreement with recommendations to use BMI, skepticism about treatment effectiveness for overweight, and/or various environmental factors (Table 3).

Lack of familiarity—A small number of participants (8%) reported being unaccustomed to using BMI, noting that it had not been emphasized in their training or practice settings. As one provider commented, “Even if there was a concern for the child being overweight, it was incredibly rare for us to do or discuss...BMI for the child”.

Lack of agreement—Other focus group participants expressed doubts about the utility of BMI as a diagnostic tool, questioning its predictive potential or its appropriateness for individuals such as athletes. Some participants (24%) objected to using BMI as something that might stigmatize children as overweight, or discussed the challenges of communicating BMI results without “losing their audience” or alienating families. Another focus group participant described the difficulty of making the risk implications of a high BMI meaningful:

When you work with numbers with heart patients, you’ve got the Framingham study, you can tell them there’s a 10% chance of having a heart attack. You can’t say that with body mass index. [...] You just say, “You’re at risk for being this overweight later in life” [...]. And that doesn’t hit some people.

We also asked focus group participants to comment on AAP recommendations⁸ regarding how often to assess BMI and how to classify risk. In general, providers were either unfamiliar with the recommendation to assess BMI annually or perceived the recommendations as “unrealistic”. Several (13%) providers commented on the competing priorities they face during well-child visits and described BMI and overweight assessment as part of the “laundry list of things that...you should be doing at each visit”. One participant summarized the difficulty of

balancing other patient care needs with responding to “tidal wave [of childhood overweight] coming at us,” saying:

It’s very frustrating..., we’re in a sea of disease, and you only have so much time to devote to so many different problems. And we don’t have the tools to devote a lot of time to obesity situations because there’s so many other things that we can do something about...

Skepticism about treatment effectiveness—One-fourth of participants questioned the relevance of BMI for intervention. Their reservations included having “nothing to offer” their overweight patients and a belief that knowledge of BMI fails to contribute to the desired outcome of weight loss. One practitioner suggested that “it’s almost cruel to use the BMI, it’s like a screening test where you’ve got no treatment”.

Environmental barriers—Within the 5 groups that did not routinely use BMI, participants cited several practice-level characteristics that discouraged use of BMI, including the persistence of outdated growth charts that lack a BMI component and failure of office staff to accurately or consistently measure height and weight. In practices without EMR-based calculation of BMI, many participants described BMI as inconvenient, requiring “extra steps” to calculate and interpret. When BMI calculation was an individual provider responsibility, participants described the added time as a barrier: “Anything that takes time is a problem, ‘cause if I have to get out a piece of paper and calculate the BMI, I’m probably not going to do it”.

Factors Facilitating Use of BMI

In the 5 practices that did not have automatic calculation of BMI within an EMR, individual participants described factors that led them to occasionally or routinely use BMI (Table 4).

Provider tools—Participants who used BMI nearly always described a mechanism for calculating it, most commonly personal digital assistants (PDAs; 8% of participants) (Table 4). Participants also agreed that they were more likely to use BMI if they did not have to perform the calculation themselves. As one summarized, “If you can have your nurse or helper plot it for you before you get in the room, then...[the BMI] is going to get used”.

Diagnostic benefits—Some providers (21%) believed BMI was a “valuable diagnostic tool” that could facilitate a more “scientific” and “objective” identification of overweight. Several (11%) reported using BMI in situations where the evidence provided by visual assessment or growth charts was ambiguous, such as when there was a “gross mismatch” or “discrepancy” between height and weight percentiles, or when differentiating between “big” and “overweight” children. Providers reported being surprised by BMI results in cases where they had not suspected overweight or where “the [height and weight] graphs [did not] look that bad”.

Counseling benefits—Some participants (32%) suggested that BMI plots enhanced their ability to communicate risk to patients or parents by having something “to show...on paper,” allowing them to “reframe the situation as a specific medical problem” without blaming the families. As one provider commented: “You say, ‘Your kid’s body mass index number is bad, it’s high,’ you can blame the number and say the number is bad rather than the kid is bad or the kid is fat”. In a few instances, focus group participants (16%) discussed the potential value of the BMI in prompting more intensive counseling efforts, or triggering additional diagnostic steps such as glucose-tolerance and blood pressure testing.

DISCUSSION

Our study is the first that we are aware of that uses qualitative methods to elicit pediatric primary care providers' thoughts and feelings about use of body mass index and identification of overweight. Previous studies have used quantitative methods to examine the diagnosis of overweight and were conducted before or just after the release of the 2000 CDC growth charts that incorporate BMI^{11, 13}. Conducting our focus groups four years after the revised growth charts were released allowed us to examine providers' knowledge of and attitudes about BMI and related recommendations after an opportunity to implement them.

Previous work suggests that pediatric primary care providers feel ineffective in the face of the rapidly growing challenge posed by childhood overweight¹⁷. Participants in this study not surprisingly reiterated that childhood overweight is "overwhelming," both because of the number of children affected and because of the problem's complex root causes and solutions. Identifying barriers to the effective management of demanding clinical problems can be the first step toward determining what types of tools, resources, and support clinicians need. Addressing the barriers with practical tools and support, in turn, can reduce the extent to which clinicians perceive the problem as uncontrollable. Attempts to lessen barriers have been useful in helping clinicians manage other complex problems that have lifestyle, behavior, and community components, such as attention deficit hyperactivity disorder²⁰.

Pediatric primary care providers may feel challenged not only by the problem of overweight, but by the need to balance early identification and counseling about overweight with other high-priority issues during well-child visits. Recommended screening and counseling already exceed the time available in many pediatric primary care visits²¹. With as few as 16 to 19 minutes available for well-child visits, providers have reported elsewhere that they do not always counsel about recommended topics such as tobacco cessation and seatbelt use²². Providers face difficult decisions in determining which topics to emphasize, and though most report that AAP recommendations are an important guide, other factors also influence their decision-making²³. Competing priorities may make it difficult for providers to fully implement new recommendations such as routine use of BMI. When providers perceive new recommendations as effective and useful, they may rely upon them more readily, as evidenced by extensive agreement with the AAP's media use guidelines²⁴. Further work may be helpful in determining how to make recommendations about identification of overweight maximally useful to pediatric primary care providers.

Practice-level characteristics influenced use of BMI in our study. In the single practice in which an EMR automatically calculated BMI, providers were unanimous about the value of BMI in their practice, even though they had not intentionally included this feature in their EMR program. Since only one practice in our study had adopted an EMR at the time this study was done, further work is warranted to confirm the potential value of EMRs in facilitating calculation and interpretation of BMI. Office systems such as EMRs that provide BMI and BMI percentile for age²⁵ are likely to be effective in prompting physicians to look at this "vital sign" and identify overweight, when present. Office systems that support best practices, make them more manageable, and integrate them into the clinical flow have been successful in other preventive healthcare areas^{26, 27}. Preventive services prompting systems are one mechanism for improving office systems, and have been used to make screening procedures and anticipatory guidance topics consistent across visits and practices^{26, 27}. BMI calculation and identification of overweight could be added to preventive services prompting systems to make it easier to incorporate these tasks into clinical practice.

In the 5 practices where a practice-wide system for calculating BMI was absent, individual providers shouldered the responsibility for calculating BMI and held varying opinions about

its usefulness. Some providers reported using PDAs to help them calculate and interpret BMI, using downloadable programs²⁸. In practices without systems for BMI calculation, PDAs and similar calculation aids may be helpful. Participants also perceived inaccurate measurement of height and weight, and staff inability or failure to calculate BMI, as barriers to using BMI. This perception highlights the potential need to involve the entire office staff in gaining skills needed to calculate and interpret BMI. One review of height and weight data revealed that only 42% of pediatric patients had both height and weight available to calculate BMI²⁵. To ensure that both height and weight measurements are available and accurate enough to guide pediatric primary care providers, staff may need periodic in-service training on height and weight measurement (available online)²⁹.

Addressing other specific barriers to BMI use raised by participants could also increase providers' comfort with using and discussing BMI. For example, providers' concern about stigmatizing patients could be addressed through training on how to conduct sensitive, family-centered discussions about weight³⁰. Providers who express concern about lack of available treatment could find it helpful to have information about programs that have documented success in improving children's weight status³¹.

We learned that participants thought BMI had diagnostic benefit for specific categories of children: those "at risk" for overweight but who cannot be identified as such through "eyeballing," and children whose weight is excessive for height. Focus group participants pointed to BMI as an objective and useful measure in such children. This finding is consistent with our earlier report that clinicians are better able to identify overweight in a hypothetical child with height and weight discrepancies when presented with BMI data, rather than conventional height and weight data⁹. A training module currently available from the CDC, which includes case studies of children of varying heights and weights who do not appear at risk visually, could help providers examine the usefulness of BMI for their practice⁷.

This study's major limitation is its small size. Although we deliberately chose practices containing a diverse range of pediatric primary care providers, with varying professional backgrounds, length of experience, and practice settings, our study is limited to one state and cannot address the extent to which participants' views are generalizable to other practice settings and regions. However, we are not aware of any unique influences within the practices or state selected that were in effect prior to our qualitative work and would markedly influence the attitudes of providers in this study. An additional limitation is that the focus group methodology used in this study, while useful in obtaining detailed information on thoughts and opinions, does not include a determination of participants' actual behaviors. Finally, it is possible that participants' responses were biased as a result of social desirability. Specifically, participants may have been hesitant to disclose behaviors that might reflect upon them unfavorably, such as lack of compliance with professional recommendations. To minimize socially desirable answers, we reviewed ground rules for focus group discussions with all participants, encouraging participants to share all opinions and reminding them that there were "no right answers"¹⁶.

Early identification of overweight is a potentially important, but not sufficient, step toward comprehensive care for overweight and at-risk children and adolescents in primary care settings. Routine use of BMI could help providers to take this first step and maximize their impact on preventing and treating overweight. Primary care-based studies are needed to evaluate whether tools to aid in BMI calculation and interpretation actually increase its use. Ultimately, we also need to determine whether improved identification of overweight children through use of BMI results in earlier treatment and improved short- and long-term weight control. Our research group has used the results outlined above to design tools for rapid, systematic calculation, interpretation, and communication of BMI³². These tools are being

tested in a trial of primary care-based prevention and management of childhood overweight. Further work such as this should help us understand more about the potential to address the valid concerns about and barriers to BMI use that were described by our focus group participants.

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Abbreviations

AAP, American Academy of Pediatrics; BMI, Body Mass Index; EMR, Electronic Medical Record; PDA, Personal Digital Assistant; CDC, Centers for Disease Control and Prevention.

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Table 1

Focus Group Guide Questions

Key Question	Sample Probe
How do you usually identify or diagnose overweight children and adolescents in your practice?	Do you use the BMI growth charts?
What do you think about using Body Mass Index (BMI) to identify overweight children and adolescents?	To what extent has your practice started using BMI to identify overweight children and adolescents?
What makes using BMI growth charts easy or difficult?	What are some of the barriers to implementing the BMI growth charts?
The AAP has published recommendations about overweight and obesity, which include the recommendation to "calculate and plot BMI once a year in all children and adolescents". What do you think about this recommendation?	Has this recommendation has changed your clinical practice?

Table 2
Strategies Used By Primary Care Providers To Diagnose Childhood Overweight

Strategies	Sample Comments
1. Visual assessment	
a. Observe patient	"The obvious ones just sort of hit you in the face, and it doesn't take a lot of time, just a visual observation."
b. Observe family	"...I tend to look at the whole family, the parents and then sometimes...other kids in the family are there, ...and try and see if the kid is the one person in the room who seems to be overweight or if others like the parent or other siblings are also overweight."
2. Charting	
a. Assess weight	"I was guilty of just getting the height and weight separately and mainly going by the weight chart only."
b. Assess height/weight	"I look at the weight for age and the weight for height...and don't usually bother with the BMI."
c. Assess trends	"More and more we're getting them when they cross lines, so if they go from the 25th percentile when they were 3 and they're 6 and now they're 75th percentile, we're beginning to bring that to the parents."
3. Body Mass Index (BMI)	
a. Calculate if concerned	"We didn't calculate BMI...unless there was something that would make us say, 'Okay, let's calculate this kid's BMI so we can see where they're at.'"
b. Calculate routinely	"I'm probably doing more BMIs...I've been trying to get more of those at risk for overweight.#x201D;

Table 3
Barriers Perceived By Pediatric Primary Care Providers to Use of BMI

Barriers	Sample Comments
1. <u>Lack of familiarity</u> Not part of provider's routine	"It's a habit of not doing it... And now attention and awareness is being raised nationally and statewide as well, and the whole premise for pediatricians..., we're supposed to be doing this. [...] In 2 years, I would suspect that that's going to be the case here."
2. <u>Lack of agreement</u> Not appropriate as a diagnostic tool Competes with other visit priorities Difficult to communicate results Stigmatizing to be labeled overweight (labeling)	"I think some people criticize the BMI 'cause it takes no assessment for...body frames. You have this massive football player who's all muscle, his BMI is yucky, but he's...nothing but muscle." "I only have so many minutes in a well-child checkup or whatever visit I'm fitting all this new stuff into, so I've got focus on what's important and the BMI is just fluff for me, so I quit using it." "Most parents are not going to understand what a BMI means, or...what that means for the child..." "I want to tell them the health information; at the same time, I worry about labeling the kid and making the family feel bad."
3. <u>Skepticism about treatment effectiveness</u> Not useful in the absence of effective treatment Not useful for counseling	"You just keep hearing this drumbeat..., 'this child's obese,' 'that one's obese,' 'that one's obese,' and then if you don't feel like you can do anything for them, then eventually it just becomes something you almost ignore, because you don't know how to respond to that alarm that keeps going off when you look at the BMI." "Until there are recommendations to trigger certain things at certain BMIs..., I wouldn't really use it so much, to change my practice."
4. <u>Environmental factors</u> Not included on older growth charts Inaccurate measurement Office systems not compatible with calculating BMI	"If you've got a child over age 2 who has the older child growth chart in there that's the old model, and they haven't converted that chart to the new one...they might put in a second BMI chart, or they might not." "The nurse would just put the same one in from last time, or just ask them what their weight is right now instead of actually weighing...so it was impossible to know the accuracy of the actual weight." "I think we have to catch it in the context of all the other things that are going on in the practice. [...] Our nurses...sometimes feel like the whipping boy, because every time there's extra work to be done, it's not usually the doctors or the clerical staff that end up doing it, it's the nurses."

Table 4
Facilitators of Pediatric Primary Care Providers' Use of BMI

Facilitators	Sample Comments
1. <u>Provider tools</u>	
Calculated by computer or other staff	"The nurses just enter the height and the weight values and it's an automatic calculation, and it works great."
Prompt within medical record	"I don't use the BMI for the parents, it's more something for the medical [record], just to document from that standpoint."
2. <u>Diagnostic benefits</u>	
Confirm visual diagnosis	"Obviously, most of the kids who are overweight, I probably calculate their BMI a little more quickly than someone who looks like they are appropriate in terms of their size and height. The appearance is probably the thing [that] makes me calculate it."
Assess discrepant height and weight measures	"If the height and the weight are spot on the 50th percentile, sometimes I wouldn't plot the back side [BMI] at all. And when the weight's at the...85th percentile and the height's at the 50th percentile, ...then I would be more likely to plot it out."
3. <u>Counseling benefits</u>	
Provide an objective number	"It's one thing to look at a child and say that they're overweight or obese, but you give them a number, it's just a little extra piece of information. It's kind of like, 'how bad was that earthquake?' 'Well, it was a pretty bad earthquake.' [...] It provides them with some scale, it might be just a little bit of extra information for them to help process the facts."
Communicate risk	"[The BMI] may provide communication to the parents better. That's the one place where it looks like it may make a difference. That you can show a parent just exactly, I mean you say 'Your child is at risk for being overweight.' They're a little chunky baby fat kid, they may not even pay attention to you. You show them on a chart, yeah, that may make a difference."
Trigger intervention	"If you see someone that's overweight, [a BMI] does sort of trigger that you're more likely to counsel them harder on that."