Impact of Interview Route Maps: Single Examiner Case Study

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Abstract

Interview Route Maps (IRMs) are visual aids that can be used to represent topical coverage of relevant questions in a polygraph examination. They are simple box and line schematics using words that encompass the elements of a given relevant question. These tools can be implemented during the question review process, prior to data collection. In the current project, performance by a single polygraph examiner was tallied, using 200 pre-employment polygraph examinations, both before and after implementation of multiple procedural changes to include additional follow up questions in a pretest interview booklet, slight modification of relevant questions, and introduction of IRMs. Following these procedural changes, the proportion of new information arising from the polygraph process increased from .215 to .410. Due to the fact that multiple variables were changed across the samples, it is impossible to determine the precise increase of reportable information afforded by IRM use. However, this case study provides initial evidence that IRM use may represent a potential element in this increase.

Introduction

Public information reveals that polygraph screening is allowed in the screening of United States Government, state and local level employees, and for national defense purposes (29 U.S. Code Chapter 22 § 2006 – Employee Polygraph Protection Act), representing a wide and pervasive context of application. The National Academy of Sciences (2003) provided a negative assessment of polygraph screening. One specific concern raised by this report was the fact that there were not specific or known behaviors addressed by the screening questions. In other words, there are no known foci of investigation with such tests. The report indicated that lower accuracy rates could be expected for screening examinations versus criminal incident examinations because the former examinations were more ambiguous for examinees than the latter. Such concerns represent considerable challenges, given the extensive application of screening polygraphs. This concern is reasonable, considering that criminal incident examinations include relevant questions that pertain to a known act or crime, while screening examinations encompass broad issues, such as criminal behaviors and acts pertaining to national security issues (Department of Defense Polygraph Institute, 2006).

One approach to address this concern of ambiguity within polygraph screening takes the form of Interview Route Maps (IRMs). The IRM term was first coined by Milne and Bull (1999) and took the form of a cognitive aid in an investigative interview. Other researchers have developed and used visual schematics to assist in encoding and learning information (Buzan, 1991; Tolman, 1948). Additional work has demonstrated that visual use of diagrams show significant improvements in comprehension and understanding, relative to when only text or verbal approaches are used (Butcher, 2004; Carlson, Chandler, & Sweller, 2003; Clarke, Flaherty, & Yankey, 2006).

These IRMs provide a natural solution to address the breadth and ambiguity repre-

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sented by polygraph screening questions, providing a visual reference for broad-reaching relevant question discussion and clarification. Examples of these box and line schematics can be found in Appendix 1. Given that a large amount of neural resources are devoted to visual information processing, in comparison to auditory information processing (Grady, 1993), it is reasonable to expect that these visual tools will help to define question parameters more clearly. In addition, the research cited previously suggests a robust effect for enhancing comprehension and understanding, which, by logical extension, should help to reduce ambiguity associated with relevant questions in polygraph screening.

A primary purpose of this case evaluation was to evaluate the impact of including the IRMs included in Appendix 1 into the polygraph screening process. Four points need to be addressed from the outset. First, IRMs were not the only variable that changed in this case study. Minor wording changes were applied to the relevant questions, though the substantive content of the questions remained constant. In addition, other changes were made to a booklet used in the pretest interview prior to the data collection process. Ultimately, it needs to be made clear that any outcomes observed before and after implementation of the changes to be described subsequently cannot be solely attributed to the introduction of the IRMs into the process.

Second, outcomes for this case evaluation will be derived from screening polygraph examinations. In this context, it is impossible to assess ground truth, or the actual disposition of any examinee, whether truthful or deceptive. Therefore, more attractive polygraph outcomes, such as accuracy cannot be applied or assessed. Third, only one set of decision outcomes was assessed, so that no index of polygraph reliability could be calculated. Finally, the application of the IRMs took place in the pretest, only during the relevant question review and were not used as visual stimuli during the data collection process.

Method

Cases and Polygraph Examiner

Two-hundred Pre-Employment polygraph reports conducted in 2014 by one examiner were reviewed. These exams were conducted between January 2014 and November 2014, and represented an exhaustive sample. The polygraph examiner was employed by a law-enforcement agency located on the West Coast of the United States, and was not one of the authors.

Initial Sample Procedures

The exams were Directed Lie Screening Tests (DLSTs) (Handler, Nelson, & Blalock, 2008; Nelson, 2012) scored with the Empirical Scoring System (ESS) (Handler, Nelson, Goodson, & Hicks, 2010; Nelson, Handler, Shaw, Gougler, Blalock, Russell et al., 2011; Robertson, 2014; many others). No Significant Response (NSR) decisions were rendered if a value of +1 or greater subtotal (overall vertical spot score) was produced for all relevant questions and Significant Response (SR) decisions were rendered if a value of -3 or lower subtotal was produced for any individual relevant question. The following target questions were included:

> R1 - Are you now concealing any theft from where you have worked?
>
> R2 - Are you now concealing your involvement with illegal drugs?
>
> R3 - Are you now concealing any unlawful sexual behavior?
>
> R4 - Are you now concealing any serious crime?

The examiner was using an interview booklet that started with the following questions about lying in the application:

> 1- Did you answer truthfully all of the questions on your Personal History Statement and Pre-Investigative Questionnaire?
>
> 2- Did you intentionally omit any information or facts that you feel may disqualify you from this position?
>
> 3- Did you add, embellish, enhance or minimize any information on any of the submitted paperwork?

Subsequent Sample Procedures

The first author was hired in October 2014 and implemented the following changes. First, a new interview booklet was introduced that separated the polygraph interview from the background questionnaire. This author thought the opening questions of the interview placed emphasis on whether applicants were truthful on the application. It was theorized that examinees would be more willing to provide previously denied information if the interview would start with an appeal that encourages them to be truthful regardless of what they had provided prior to the polygraph session. This interview booklet included the following changes:

a)Appeal for examinees to be truthful.

b)Did not ask if examinees lied on any previously given information.

c)Covered and went beyond questions asked in their background questionnaires.

d)Attempted to isolate responsibility only for acts they committed (Handler et al., 2009).

Second, new target questions were introduced with multiple modifications. The word "concealing" was eliminated in exchange for direct questions (e.g., "Have you ever…"). The rationale was the belief that examinees would not admit to every single transgression pertaining to a single target. In addition, target areas were introduced that included predictive qualities (Aamodt, 2004; Handler et al. 2009):

R1 – As an adult, have you had any (other) formal discipline at work?

R2 – As an adult, have you had any (other) personal involvement with illegal drugs"

R3 – Have you ever committed any (other) serious crime?

R4 – Have you ever committed any (other) sex crime?

A related caveat was also included relative to question R2. An adult is defined as being 18 years old. Due to Agency policy, applicants over 28 years were asked 'In the last 10 years' for the drug question. In addition, physical acts of violence is defined as a serious crime.

Third, visual mind maps or IRMs were used to define target questions. These tools provide a visual reference for question discussion and clarification. Given that a large amount of neural resources are devoted to visual information processing, in comparison to auditory information processing (Grady, 1993), it is reasonable to expect that these visual tools will help to define question parameters more clearly. The IRMs used in the subsequent sample are contained in Appendix 1.

Finally, care and deliberation was taken to ensure that all words in questions were clearly defined. For example, 'other' was defined as 'besides what you have told me' and 'you' was defined as 'what you have done, not your friends, family, etc.'

After implementation of these changes, an exhaustive sample of 200 reports were examined from the same examiner, spanning from January 2015 to October 2015. Thus the results of these 200 reports were compared to an exhaustive sample of 200 reports prior to implementation of these changes, for a total of 400 reports examined.

Results

Defining Outcomes

An *Inconclusive* result indicated that hand scores did not reach the threshold for an NSR or SR decision. A *No Opinion* result reflected artifacts or unstable data. In other words, the examiner perceived the data was not clear enough to be analyzed due to artifacts, including movements, breathing distortions, etc. Countermeasure results reflected obvious attempts on the part of the examinee to manipulate the test outcome. New information reflected information gained from the pretest interview. This might include information relating to previously denied questions, elaborations on previously disclosed information, and/or criminal behavior, including drug in-

volvement, and questions regarding the character of the applicant (work history, current frequency of intoxication, etc.). Finally, Repetition Required indicated that the polygraph examiner had to repeat a subtest to reach an outcome. Table 1 shows the frequencies produced by the polygraph examiner before and after implementation of the new training.

Table 1. Outcomes as a function of initial and subsequent sampling.

	Initial Sample	Subsequent Sample
No Significant Response	112 (.560)	118 (.590)
Significant Response	55 (.275)	55 (.275)
Inconclusive	13 (.065)	5 (.025)
No Opinion	14 (.070)	10 (.050)
Countermeasures	6 (.030)	12 (.060)
New Information	43 (.215)*	82 (.410)*
Repetition Required	53 (.265)	50 (.250)

Note. * Statistically significant difference.

Proportion tests (Bruning & Kintz, 1987) were used to assess differences between the initial and subsequent samplings. The difference in new information between the initial and subsequent sample reached statistical significance, $Z = -4.21$, $p < .0001$. The difference in the proportion of inconclusive decisions was marginally significant, $Z = 1.93$, $p = .0537$. No other differences were statistically significant (all ps > .140).

Discussion

Evidence from the present project suggests that among other modifications (i.e., changes to relevant questions and change to pretest booklet), the use of IRMs produced a significant increase in the amount of information elicited in the pretest interview. No other significant differences were produced, suggesting that implementation of IRMs will not detrimentally impact screening polygraph results decision outcomes.

A key element from the present study is an explanation as to what caused the increase in reportable information in the subsequent sample. Without the luxury of debriefing interviews on polygraph examinees, any explanation is tantamount to conjecture. That being said, one possibility is the visual representation of the elements demonstrated in each IRM may have made it more difficult for examinees to gloss over or rationalize their way out of their previous behaviors during pretest or posttest interviews, ultimately leading to more forthcoming behavior. Again, without additional data, this explanation cannot be substantiated.

Once again, it should be clearly understood that other changes to the testing booklet and relevant questions were also rendered over the course of this project. The outcomes assessed in this case study could not address accuracy performance, given the inherent difficulty in determining ground truth in screening examinations. This study represents value from an ecological validity standpoint, given

that it is a field study with real world stakes and jeopardy for the examinees. However, it suffers in this same respect, given that it captures performance from only one polygraph examiner, which of course limits generalizability to the population of polygraph examiners.

Based on these results it is recommended that IRMs be added as a standard component to screening polygraph examinations, and that further research into their use be conducted. Sprinkled with the caveats addressed previously, IRMs appear to be a component of the polygraph screening process that can afford significant increases in the utility of the screening polygraph process. It is highly recommended that the impact of IRMs on polygraph examinations be assessed in laboratory studies where more definitive performance results such as accuracy can be evaluated. In addition, such contexts may allow for the identification of explanations for increases in disclosures against self-interest. Finally, future work in this area should involve carefully designed studies that allow for the clear assignment of causality as a function of the presence or absence of the IRMs in isolation, as opposed to the confounded assessment in the present study.

References

Aamodt, M. G. (2004). *Research in Law Enforcement Selection.* BrownWalker Press, Boca Raton.

Bruning, J. L. & Kintz, B. L. (1987). *Computational handbook of statistics* (3rd. ed.) Glenview IL: HarperCollins, 272-275.

Butcher, K. R. (2004). Effects of diagram complexity on comprehension processes and learning outcomes. *Dissertation Abstracts International*, 64(11-B), 5809.

Buzan, T. (1991). The Mind Map Book. New York: Penguin.

Carlson, R., Chandler, P., & Sweller, J. (2003). Learning and understanding science instructional material. *Journal of Educational Psychology*, 95(3), 629-640.

Clarke, I., Flaherty, T. B., & Yankey, M. (2006). Teaching the visual learner: The use of visual summaries in marketing education. *Journal of Marketing Education*, 28(3), 218-226.

Employee Polygraph Protection Act – 29 U.S. Code Chapter 22 § 2006

Grady, D. (1993). The vision thing: Mainly in the brain. Discover, June.

Handler, M., Nelson, R., & Blalock, B. (2009). A focused polygraph technique for PCSOT and law enforcement screening programs. *Polygraph*, 38(1), 77-88.

Handler, M., Nelson, R., Goodson, W., & Hicks, M. (2010). Empirical Scoring System: A cross-cultural replication and extension study of manual scoring and decision policies. *Polygraph*, 39(4), 200-215.

Milne, R. & Bull, R. (1999). Investigative Interviewing Psychology and Practice, Wiley Series in The Psychology of Crime, Policing and Law, (Davies, G. & Bull, R. (Eds). Chichester: John Wiley & Sons, LTD.

National Research Council (2003). *The Polygraph and Lie Detection*. National Academies Press.

Nelson, R. (2012). Monte Carlo study of criterion validity of the directed lie screening test using the Seven-Position, Three-Position, and Empirical Scoring Systems. *Polygraph*, 41(4), 241-251.

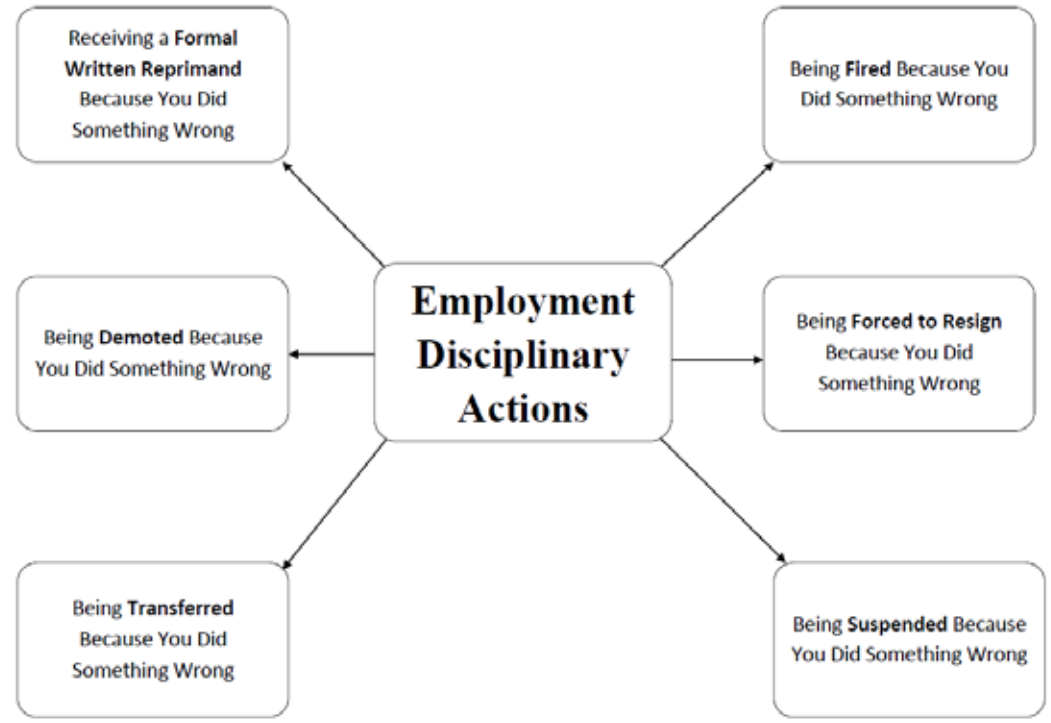
Nelson, R., Handler, M., Shaw, P., Gougler, M., Blalock, B., Russell, Cushman, B., & Oelrich (2011). Using the Empirical Scoring System. *Polygraph,* 40(2), 67-78.

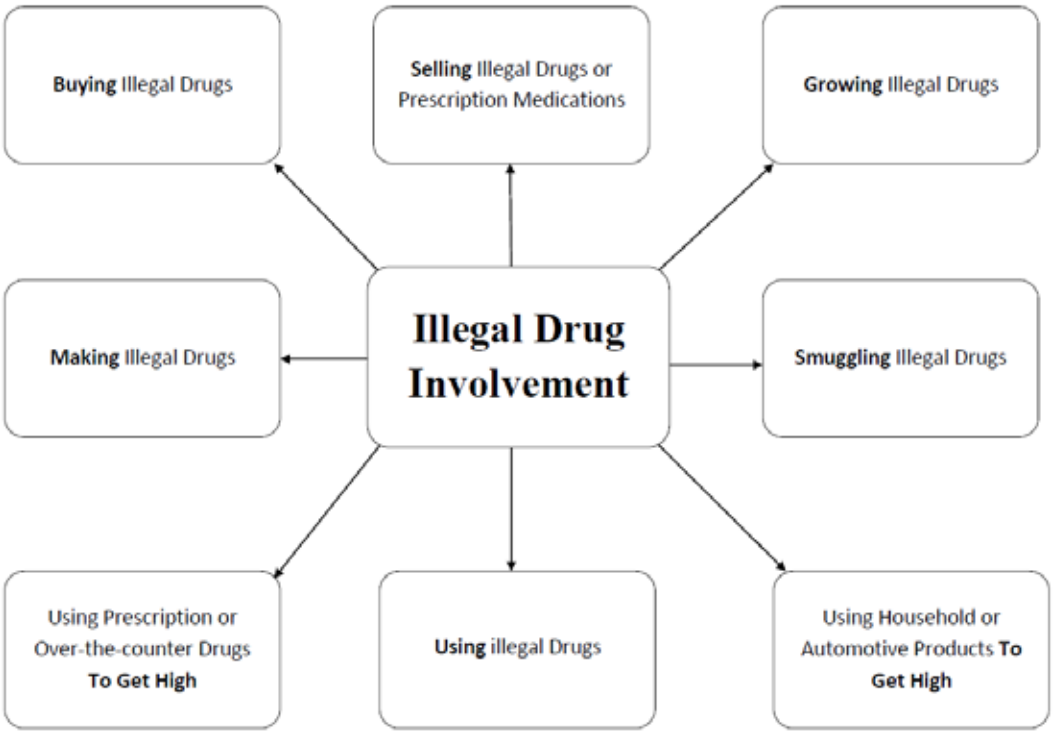
Robertson, B. (2014). The use of an enhanced polygraph scoring technique in homeland security: The Empirical Scoring System – making a difference. *Polygraph,* 43(3), 79-111.

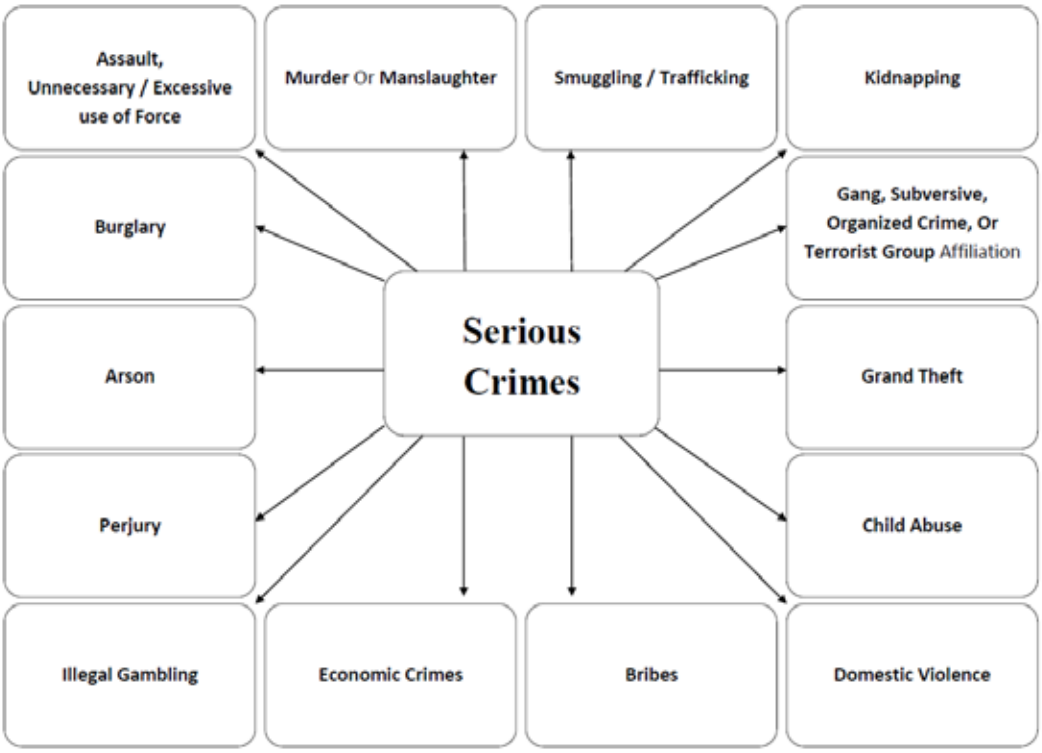
Tolman, E.C. (1948). Cognitive maps in rats and men. *Psychological Review*, 55, 189-208.

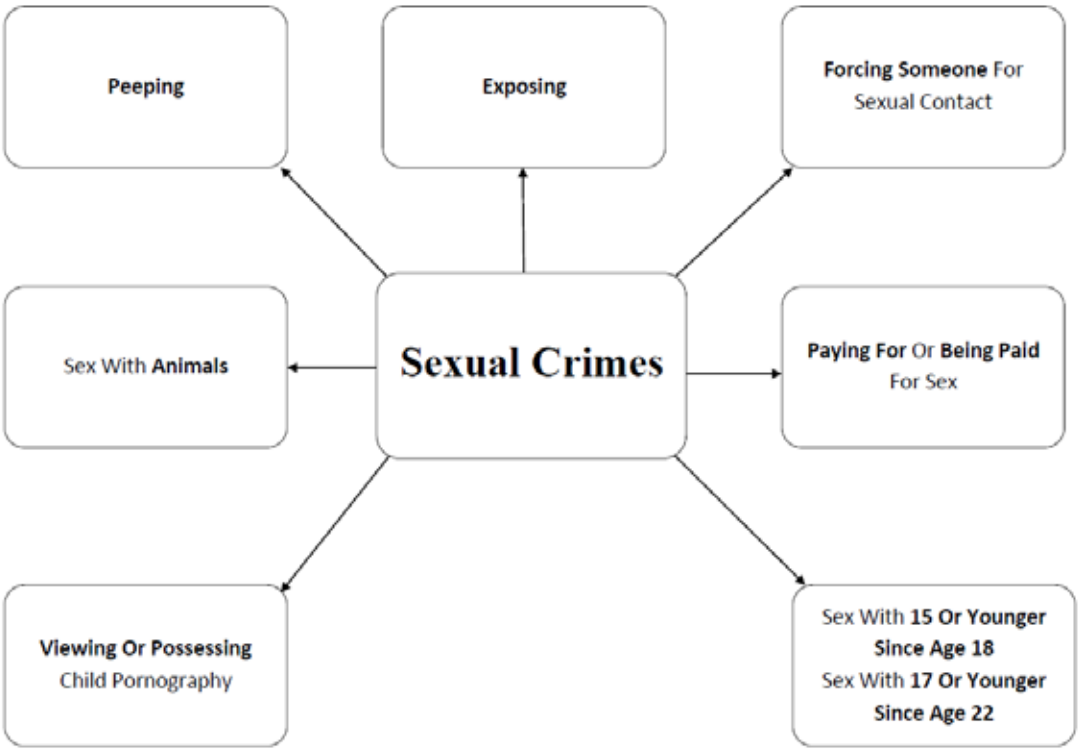
Department of Defense Polygraph Institute (2006). Federal Psychophysiological Detection of Deception Handbook. *Polygraph*, 40(1), 2-66.

Appendix 1


Employment Disciplinary Actions
Receiving a **Formal Written Reprimand** Because You Did Something Wrong
Being **Fired** Because You Did Something Wrong
Being **Demoted** Because You Did Something Wrong
Being **Forced to Resign** Because You Did Something Wrong
Being **Transferred** Because You Did Something Wrong
Being **Suspended** Because You Did Something Wrong


Illegal Drug Involvement
Buying Illegal Drugs
Selling Illegal Drugs or Prescription Medications
Growing Illegal Drugs
Making Illegal Drugs
Smuggling Illegal Drugs
Using Prescription or Over-the-counter Drugs **To Get High**
Using illegal Drugs
Using Household or Automotive Products **To Get High**


Assault, Unnecessary / Excessive use of Force
Murder Or Manslaughter
Smuggling / Trafficking
Kidnapping
Burglary
Gang, Subversive, Organized Crime, Or Terrorist Group Affiliation
Serious Crimes
Arson
Grand Theft
Perjury
Child Abuse
Illegal Gambling
Economic Crimes
Bribes
Domestic Violence


Peeping
Exposing
Forcing Someone For Sexual Contact
Sex With Animals
Sexual Crimes
Paying For Or Being Paid For Sex
Viewing Or Possessing Child Pornography
Sex With 15 Or Younger Since Age 18
Sex With 17 Or Younger Since Age 22