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Analysis of the effectiveness of a training program for parents of children with ADHD in a hospital environment

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Introduction. Regarding the Attention Deficit Hyperactivity Disorder (ADHD), treatments combined with pharmacological, psychoeducational and parents training programs interventions are recommended. Parenting programs have been proven efficacy in the experimental area, but there is few data about their effectiveness and feasibility in the professional area. The objective of the study is to analyze the effectiveness of a parenting program implemented in a hospital setting to improve internalized and externalized behaviors as well as parenting styles in a sample of ADHD children.

Methodology. A training program for behavior management was applied to parents of 21 children with ADHD in a quasi-experimental pretest-posttest design, using measures from *Child Behavior Checklist* (CBCL) and *Parenting Scale*.

Results. Post-treatment data showed significant improvements specially on emotional, anxiety and oppositional defiant disorder measures. A significant but moderate improvement was found on ADHD, and non-significant on conduct problem measure. Additionally, there were moderate but significant improvements in parenting styles.

Conclusions. Data support the effectiveness and feasibility of parent training programs for children with ADHD applied in hospital settings as they improve a large part of associated symptoms and parenting styles.

Keywords: ADHD, Parental Training, Parenting Styles, Comorbidity

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Análisis de la efectividad de un programa de entrenamiento de padres de niños con TDAH en un ambiente hospitalario

Introducción. En el Trastorno por Déficit de Atención e Hiperactividad (TDAH) se recomiendan tratamientos combinados con intervenciones psicoeducativas, farmacológicas y programas de entrenamiento para padres. Estos programas han demostrado eficacia en el ámbito experimental, pero existen pocos datos de efectividad y viabilidad en el ámbito profesional. El objetivo del estudio es analizar la efectividad de un programa para padres aplicado en ámbito hospitalario para mejorar las conductas internalizadas, externalizadas y los estilos de crianza en una muestra de niños con TDAH.

Metodología. Se aplicó un programa de entrenamiento para manejo de conductas problema a los padres de 21 niños diagnosticados de TDAH en un diseño cuasi-experimental pre-post, utilizando medidas del *Child Behavior Checklist* (CBCL) y de la *Parenting Scale*.

Resultados. Los datos mostraron mejoras postratamiento especialmente significativas en las medidas de problemas afectivos, de ansiedad y de negativismo desafiante, moderadas en TDAH e insignificantes en disocial. Por otra parte, hubo mejoras moderadas pero significativas en los estilos de crianza.

Conclusiones. Los datos apoyan la eficacia y la viabilidad de los programas de entrenamiento de los padres para los niños con TDAH aplicados en entornos hospitalarios, ya que mejoran una gran parte de los síntomas asociados y los estilos de crianza.

Palabras clave: TDAH, Entrenamiento Parental, Estilos Educativo, Comorbilidad

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INTRODUCTION

Attention Deficit Hyperactivity Disorder (ADHD) is characterized by being a neurodevelopmental disorder with difficulties in the attention area, hyperactivity and impulsivity, which interferes in a marked way in the family functioning, school functioning and in the child's own development[1]. It has an estimated prevalence of around 5%[2,3]. In addition, it presents a high comorbidity: it can be affirmed that more than 44% of children with ADHD have at least one comorbid psychiatric disorder, being the most frequent: Behavior Disorder, Oppositional Defiant Disorder, Anxiety Disorder, Depression and Learning Disorders[4]. Therefore, ADHD is considered a heterogeneous disorder with implications in multiple domains and areas of functioning of the child[5].

Usually the treatment of ADHD is psychopharmacological, but it should be remembered that according to the guide for ADHD of the *UK National Institute for Health and Care Experience*[6], this treatment should be reserved for children over the age of six, with symptoms and severe affection. For younger children, or those same ages but without these severity levels, educational and training programs in problem behavior management are recommended. In this sense, the American Psychological Association (APA) recognizes that these types of treatments can be considered empirically as "well established"[7]. On their behalf, the American Academy of Child and Adolescent Psychiatry (AACAP)[8] recommends, in general, although there should be adaptations for each case, a joint intervention with psychoeducational sessions, pharmacological treatment and parent training. The advantage of the combined approach is that pharmacological treatment achieves symptomatic improvements in a short time, and parent training can help to consolidate improvements[9]. The effectiveness and safety of properly applied parent training, structured training and expert therapists has been demonstrated in multiple studies[10].

In this sense, among the parent training programs in the management of behavioral problems applied to children with ADHD, it has been highlighted in the latter the proposal of R. A. Barkley[11,12]. The program has been successfully applied at both individual and group level[11]. During the implementation of the program, consideration is not only given to parent training in techniques to improve the child's behavior, social relations and general adaptation, but also to identify those factors that may be hindering its application and, especially , the effect that the behaviors have on the parents. It has long been known that the typical behaviors of children with ADHD negatively impact their parents 'or educators' perception of them, causing family stress and maladaptive parenting styles[13,14]. Therefore, parent training not only focuses on the teaching of specific techniques for parents but especially in changes in family interactions so that they learn or re-connect in a positive way with their children.

In the Cochrane review of Zwi, Jones, Thorgaard, York and Dennis[15], which analyzes the effectiveness of interventions based on parent training with children with ADHD, there are only five studies that meet the strict methodological criteria set: four are centered in behavioral modification of children (two at home and two at school) and one in improving parental skills. One of the studies, focused on improving the behavior of children at home, found no difference between parent training and usual treatment (i.e., parent training is effective but no more than usual treatment), while in the other parent training was superior to a control group. Although the authors emphasize the significant methodological limitations in all studies, they conclude that parent training can have positive effects, both on externalized and internalized behaviors, and on parenting styles.

In this manner, despite some limitations, the effectiveness of parent training programs is widely accepted, however there are few studies on the effectiveness of these treatments. That is, most of the data were obtained in an experimental setting, with a design and selection of participants for the study as well as being focused on the direct measures of ADHD symptoms (inattention, impulsivity and hyperactivity) and problem behaviors. However, we have very few studies carried out in the clinical (professional) field and that include both measures of externalizing and internalizing behaviors and also the effect of treatment on the parenting styles. A partial exception to this limitation is the recent work by Loren et al.[16], in which families of 241 children with ADHD received an eight-session training based on the Barkley program, without being monitored whether or not they received pharmacological treatment. Only two measures were used to evaluate the effectiveness of the program: one that measured the child's dysfunctional level in different settings and one item that measured the degree of confidence in the management of ADHD by parents. The results indicated a significant improvement in all measures, comparable to that obtained in the controlled studies.

In a similar line to the work of Loren et al.[16], the first objective of the present study is to evaluate the effectiveness (i.e. not its efficacy, since under experimental conditions we consider it proven) and the viability of a training program for parents, applied in the context of the usual treatment for children with ADHD, to reduce internalized and externalized behaviors. The second objective is to evaluate whether the program is also useful for improving the parenting style perceived by the parents themselves. It is hypothesized that improvements will be evident in all measures.

METHODOLOGY

Participants

The participants of the training in the behavior management program were the parents of pediatric children referred to the Child and Youth Mental Health Unit of the Hospital Son Espases de Mallorca, for presenting pathology compatible with ADHD. In order to be part of the program, parents had to have children who fulfilled these inclusion criteria: aged between 6 and 12 years old, confirmed diagnosis of ADHD according to DSM-IV criteria[17] and who did not present comorbidity nor in Axis I: neurodevelopmental disorders, bipolar disorder and psychotic disorder, nor in Axis II: mental retardation. At the end, 27 families accepted to participate, although the final sample is composed of 21 families, since in six cases it was impossible to obtain the post-treatment evaluation. All children were part of the multimodal intervention program in ADHD cases that is applied in our unit, so that, apart from the parent training program that is the subject of this study, they all started to be medicated with methylphenidate, two and four weeks before the start of the program, with daily doses varying between 18 and 36 milligrams depending on the weight of each child. The average age was 8.25 years old (with an interval between 7 and 10 years of age) and 71% were males. As for the parents, their average age was 38.54 years old (with an interval between 28 and 42 years of age), 18% were separated pairs, and in only five cases did both parents attend (in the rest only the mothers attended).

Procedure and experimental design

The present study was approved by the ethics committee of the University Hospital of Son Espases.

The training program for parents was composed of ten sessions with a weekly frequency. The sessions were developed in a group consisting of a minimum of four and a maximum of nine families, under the supervision of one or two therapists, with a duration of 90 minutes. The minimum number of sessions attended by all parents was eight.

All sessions presented a similar structure (see the description of the contents of each of the sessions in the annex): with the help of slides, the presentation of the objective of that day and the subject to be treated began. Once the subject was introduced, the modeling of the skills that had to be learned was finalized and the training as well as the testing of these abilities were completed by means of the role playing technique. With the exception of the first session, all the others began and ended with a proposal of action for home. In this way, each session began with the revision of the tasks proposed in the previous session and ended with the assignment of a new proposal of tasks related to what had been learned. All this was intended to generalize the family context to the skills learned during the training.

The present study is based on a quasi-experimental design with a pre-post group. The independent variable is the training program for parents in the hospital environment and the dependent variables are six psychopathology scales (internalized and externalized measures) and three parental practices described in the section on instruments. These types of designs are not adequate to evaluate the efficacy of the independent variable, since there is no control group, but they allow evaluate its effectiveness, i.e. its viability and its results applied in clinical (non-experimental) conditions. The analysis of results was based on a comparison of the pre and post-treatment means of the dependent variables. Apart from statistical significance, the effect size for related samples was calculated through Cohen's *d* statistic. In the case of internalized and externalized measures, the difference in the percentage of children that exceeded the clinical cut-off point between pre and post-treatment evaluations was also analyzed. This cut-off point was established from a T score greater than 65.

INSTRUMENTS

First, the Achenbach Child Behavior Checklist (CBCL) was used in its parent version[18]. It is a questionnaire assessing adaptive behaviors and behavioral problems aged between 4 and 16 years of age, where each item is evaluated from 0 to 2 points, with the highest scores indicative of more behavioral problems. In this work, six scales were used that refer to the DSM-IV diagnostic categories (AD= Affective Disorders, ANX= Anxiety Disorders, SOM= Somatic Disorders, ADHD= Attention Deficit Disorder and Hyperactivity, ODD= Oppositional Defiant Disorder. DD= Dissocial Disorder).

Secondly, the *Parenting Scale* (PS) of Arnold, O'Leary, Wolff, and Acker[19] was used. It is a 30-item instrument intended to measure dysfunctional practices of discipline in parents. The parents are self-rated on a 7-point Likert scale and the total is extracted in three measures of parenting style: laxness, overreactivity and verbosity. Scale results are not necessarily linked to the frequency of child misbehavior, so it may even allow early identification of parents at risk.

RESULTS

Table 1 shows the differences in the pre and post-treatment measures in the six scales of the CBCL. In all CBCL

Table 1 Differences in pre and post treatment measures in the CBCL scales

	Pre-treatment (N=21)		Pre-treatment (N=21)				
	M	DE	M	DE	t	p	d
AD	60.67	9.93	53.76	6.24	3.71	0.001	0.81
ANX	62.19	9.00	54.62	6.29	4.27	0.000	0.93
SOM	52.81	5.78	50.76	1.18	1.83	0.082	0.40
ADHD	57.19	8.36	52.95	3.63	2.52	0.020	0.55
ODD	64.33	8.22	57.33	7.03	3.77	0.001	0.82
DD	54.57	6.65	54.81	6.05	-0.40	0.690	0.09

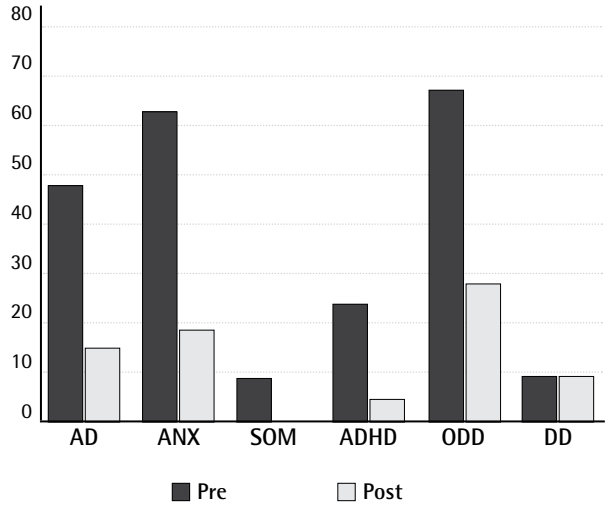
AD: Affective Disorders; ANX: Anxiety Disorders; SOM: Somatic Disorders; ADHD: Attention Deficit Disorder and Hyperactivity; ODD: Oppositional Defiant Disorder; DD: Dissocial Disorder.

measurements, except for DD and SOM, there is a significant reduction in scores. In a particular note, there are improvements in three measures: AD, ANX and ODD, whose effect size is large (>0.80). The improvement in ADHD has a moderate effect size (>0.50). As already indicated, although the improvement in SOM does not reach statistical significance its effect size is close to 0.50, which shows an interesting improvement trend. On the other hand, there have been no significant changes in DD measurement.

Regardless of overall improvement in continuous scores, it was also interesting to compare the evolution of the number of subjects with "clinical" scores on each scale. This score was set at a T score equal to or greater than 65. Figure 1 shows the results.

In all measures except DD, the percentage of participants with clinical scores decreased. This decrease was significant, with large effect sizes, in the following measures: ANX, Z=2.51, p=0.012, d=1.07; ODD, Z=2.16, p=0.030, d=0.89; AD, Z=2.00, p=0.045, d=0.94. On the other hand, it did not reach statistical significance, and with minimum or non-calculable effect sizes, neither in DD nor in SOM. In ADHD, differences did not reach statistical significance either, but the decline of 24% in pre-treatment to 4.8% post-treatment was a large effect size, d=1.01.

Table 2 shows the differences between pre and post-treatment in the *Parenting Scale*, as one can observe, there was a significant decrease in the three scale measures, although they are more evident in laxness and overreactivity than in verbosity. The three sizes of the effect can be considered small, but while the verbosity is at the point separating a small size from the minimum (0.25), the other two scales are close to 0.50, i.e., the point already indicates the presence of moderate effect sizes. In any case, the initial scores assigned by the parents were already quite low, so the room for improvement was not very high.



AD: Affective Disorders.
ANX: Anxiety Disorders.
SOM: Somatic Disorders.
ADHD: Attention Deficit Disorder and Hyperactivity.
ODD: Oppositional Defiant Disorder.
DD: Dissocial Disorder.

Figure 1 *Percentage of participants with clinical score (T> 65) on the pre and posttreatment CBCL scales*

Table 2 Differences in pre and post-treatment measures in the Parenting Scale

	Pre-treatment (N=21)		Pre-treatment (N=21)				
	M	DE	M	DE	t	p	d
LAX	2.22	0.93	1.72	0.56	3.07	0.006	0.46
OVER	2.26	0.87	1.79	0.54	2.88	0.009	0.46
VERB	2.24	0.90	1.96	0.69	2.10	0.049	0.25

LAX: Laxness; OVER: Overreactivity; VERB: Verbosity.

DISCUSSION

Behavioral training programs for parents of children with ADHD have generally shown a good or acceptable level of efficacy[6,7,9,20]. In this sense, such efficacy may be more related to the behaviors derived from ADHD and its effects rather than to the nuclear symptoms of the disorder[21]. However, the programs present problems of adherence and difficulties in their application[22], therefore, it is necessary besides checking their level of effectiveness, to analyze their effectiveness and their viability in clinical and professional environments. In the same line as Loren et al.[16], the objective of our work was to analyze the effectiveness and feasibility of a behavioral training for parents, based on the Barkley program[11], in order to verify, in our case, its capacity to improve, on the one hand, the internalized and externalized behaviors of children and, on the other hand, the parenting styles perceived by the parents themselves.

In summary, the main conclusions of our data indicate the following: after the application of the training program for parents, the children have been evaluated with very significant improvement, and with a large sized effect, in the measures of affectivity problems, of anxiety (both internalized) and in challenging negativism (externalized). The improvement has been more moderate, although significant, in ADHD behaviors and in somatic symptoms. Finally, there has been no improvement in the extent of dissocial behavior. In any case, it is important to point out that both the somatic and the dissocial problems had very low pre-treatment scores, so they did not leave much room for improvement. With regard to ratings on the parenting scale, parents recognize that they have significantly improved, especially in two measures: laxness and overreactivity, although with an average effect size. They have also improved to the extent of verbosity, although the size of the effect has been small.

Getting closer to the results of internalized and externalized measures, it is also necessary to conclude that the improvements related to pre and post-treatment scores have also been translated into the percentage of children who have managed to leave the "clinical" group defined in the CBCL[18]. Thus, between 50% and 60% of children presented with suspected affective or anxiety disorder and, after treatment, the percentages were significantly reduced to less than 20%. Likewise, about 65% of the children presented suspicion of a challenging negativistic disorder and, in the end, there were less than 30% in this situation. The percentage of children with ADHD was only slightly above 20% in the CBCL but also dropped to 5%.

In definitive terms, the improvements of our program in an applied environment, with respect to outsourced behaviors, have been similar to those reported in efficacy studies, with even more improvement in problem behaviors than in the nuclear symptoms of the disorder, as has been found in some experimental studies[21].

On the other hand, our data have also been favorable to a very relevant improvement in the internalized behaviors. In *the United States National Institute of Mental Health* a study comparing the efficacy of different treatments for ADHD[23] already found that although the pharmacology was superior in the short term to the other options on nuclear symptoms, if there was a clear presence of anxious symptoms the combined action with the parent training program was better. Probably, our results can be interpreted along the same lines, that is, since our sample of children with ADHD were medicated, it is possible that the nuclear symptoms (inattention, impulsivity and over-activity) were relatively controlled. On the other hand, other common comorbid problems such as challenging negativity or anxiety as well as mood problems could benefit from changes in parent and child interactions that favored behavioral training.

Regarding the results centered on the parenting scale, the fact that the improvements reflected in the effect sizes were not very large may be due, in part, to the fact that the initial scores were not excessively high either. Even so, our results have been quite similar to those presented by Harvey,

Danforth, Ulaszek and Eberhardt[24]. The reason why parents show less improvement in verbosity is unclear. However, this may be an effect derived from the habitual behavior of children with ADHD, which, although improving in almost all the behaviors measured, probably continues to require a high level of parental intervention. Therefore, they may have the feeling that even though they have improved in being less laxness or overreactivity, they still continue to lecture their children a great deal.

On the other hand, analyzing the interaction between the behaviors more improvements have been observed, the breeding styles and the characteristics of the program, we believe that it is possible that the relevant improvements in affectivity, anxiety and negativism may have been due to the strategies used with parents focused on promoting habits of autonomy, withdrawal of overprotection, increase of supervision in a positive way to reduce oppositional behavior and improvement of family environment. On the other hand, the lack of improvement in the dissocial behavior, apart from what has already been mentioned in reference to the lowest entry scores, may be related to factors that we do not control in this study but which we know are determinants in such as maternal mental health, low socioeconomic status, single-parent families, maternal depression, unstable housing, dependence on social subsidies, or a family history of alcoholism and drug abuse[25-29].

Finally, the results support the hypothesis that the behavioral programs of parents applied in the hospital setting are effective both in reducing most of the problem behavior of children (both externalized and internalized) and to improve behavior of parenting style.

The limitations of the present study are as follows. Firstly, even if it is an applied study (in the hospital environment), it would be advisable in the future to have a control group on the waiting list that would allow a more statistical evaluation of the results or, if necessary, to compare to another without medication. Second, it would be desirable to improve adherence to the program, since 22% of the initial sample (6 of 27 families) have been lost in this study, so a certain bias can be presumed, since the available data corresponds to the most motivated parents (being, anyway, evidence that motivation is a key variable for any training program to be able to work). Third, it would be desirable to have other measures of program effectiveness than those provided by parents. For example, in the case of children's behaviors, it would be desirable for other adults or educators to record pre and post-treatment measures as well. And in the case of the parenting style measure, it would be desirable for the mother, father and (depending on the age) the children, themselves to evaluate it in order to have a wider vision. It is clear that the fact that the parents themselves self-assess pre and post-treatment, being the subjects of the intervention, can introduce biases that should be controlled, although it is a complicated task in applied interventions, outside the scope of the laboratory. Finally, as we have already mentioned, it would be useful to collect sociocultural and economic variables from parents in order to have control variables that help to define and specify in greater detail the effectiveness levels, or limitations, of the training program.

ANNEX | Description of sessions

1st Session: Information on ADHD
It offers updated information on the different symptoms of ADHD, diagnostic criteria, etiology and prevalence, multimodal treatment. The goal is the knowledge of the disorder to identify symptoms and improve the child's difficulties. Documentation, bibliography on ADHD is given and space is offered to clarify doubts and questions about the session.

2nd Session: Child's behavior with ADHD and its consequences
An interactive summary of the previous session is made at the beginning of the session. The main objective of this session is to provide basic information on the principles of social learning, behavioral functioning, influencing factors, and on the other hand to encourage the use of techniques to increase positive behaviors, positive reinforcement, praise and chip economy or point system. To conclude the session a small workshop is held to develop a list of positive reinforcements and behaviors to praise each child. The importance of avoiding negative labels is emphasized.

3rd Session: Improve Habits of Autonomy
The objective of this session is to encourage and promote the autonomy of the child with ADHD, to know the basic autonomy habits, its advantages, what goals we can ask a child with ADHD, create a point system suitable for each child to increase the frequency of appropriate and responsible behavior. Parents should use the point system, made up in the group, during the week.

4th Session: Reduce inappropriate behavior
We proceed with the presentation of strategies to reduce minor disruptive behaviors. The extinction or ignore is one of the most relevant techniques in acting on behavior problems, since it implies the total withdrawal of reinforcement on inappropriate behavior, which implies a rapid disappearance of the same, if the technique is implemented correctly. However, ignoring is one of the most difficult strategies to carry out. A training is conducted on when and how to extinguish a behavior. The goal of extinction is to improve parent-child relationships, reducing ongoing criticism by parents, and focusing parental attention on appropriate behaviour .In the workshop is defined in an individualized way, the objective behaviors, for application of extinction at home.

5th Session: Self-esteem and self-concept
This session arises after parents have begun their first steps using the strategy of ignoring and reinforcing positive behavior. The session begins with an introductory workshop on how they define their children, how they see them. The factors that influencing self-esteem, identification of the influence of the parents in their increase and improve the positive perception of the child with ADHD. At the end, a second part of the workshop, the positive vision of the children with ADHD.

6th Session: Alternatives to Punishment
The session begins with a debate of most habitual forms of punishment and the ineffectiveness of physical and verbal punishment as a discipline technique in the face of severe behaviour. We present as alternative, the techniques of time out and repair of the damage. In the face of aggressive or destructive behaviors, which involve a strong emotional load in both the child and the parents, time outside is considered as the technique of choice, as a non-violent and rational alternative, not dependent on hostile emotions. Parents are instructed in a series of keys for an effective use of the techniques such as: duration, place of application and handling of possible difficulties during their application. At the end of the session, parents should establish a plan for the use of the technique that will be reviewed at the next session.

7th Session: Self-control and withdrawal of privileges
This session offers a different approach in the program, the action directs towards the parents. The level of stress is increased in the parents of children with ADHD, so it is necessary to equip them with coping strategies to avoid repercussions on family relationships. This session aims to improve the self-control of parents to children's misconduct, through thinking control techniques and relaxation based on breathing. At the end of the session there is a workshop dedicated to these techniques.

8th Session: Obedience
The objective of this session is to improve obedience. Increase parental authority appropriately, and improve educational coherence. They are instructed in establishing limits, to conduct by properly ordering and petitioning children avoiding, excessive instructions and the use of vague orders.
A description of the different educational styles of the parents and the influence on the children is made. At the end of the session there is debate about the establishment of basic rules for the family and how to improve the educational styles of each parent.

9th Session: Parent-child relationship
This session is dedicated to the parents' awareness of the importance of communication in the processes of daily interaction with their children. Different patterns of parent-child relationships, and the management and identification of feelings in children. To this end, parents will be trained in the ability to receive messages (active listening), as well as in message transmission skills (positive communication).

ANNEX	Continuation

10th Session: Summary on educational strategies

This session closes the program with a review of the techniques learned throughout the program. Emphasis is placed on the importance of building a firm and secure base from the promotion of positive behaviors, and on the selective but consistent use of the discipline techniques learned for negative behaviors. Likewise, a series of indications are proposed to deal with the most frequent problematic behaviors, some occurring outside the home. Finally, doubts and questions are discussed.

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