Comparison of Quality of Life Scores in Adolescents with Menstrual Dysfunction

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Objectives:
To compare the impact of common menstrual problems in adolescent women on the standard quality of life scores using the 36-item short-form health survey, and to identify particular modalities of menstrual dysfunction that are associated with significant adverse effects on quality of life.

Design:
Prospective cross-sectional observational survey.

Methods:
Adolescent females between the age of 15 and 20 years with menstrual problems as their chief complaint were recruited from a hospital specialist-led adolescent gynaecology clinic over an 18-month period. All subjects completed a structured self-answering questionnaire recording epidemiological data and a 36-item short-form health survey.

Results:
A total of 235 adolescents with menstrual problems (43 [18.2%] with dysmenorrhoea, 86 [36.5%] with oligo/amenorrhoea, and 106 [45.1%] with irregular menstrual bleeding or menorrhagia), and 60 eumenorrhoeic adolescents with no other menstrual symptoms were recruited. The mean age of the entire cohort was 17.3 years. The group with menstrual problems had significantly lower quality of life scores in the domains of general health and social functioning compared to the controls. Within the menstrual dysfunction group, the dysmenorrhoeic group had particularly lower scores in the domain of bodily pain, while the oligo/amenorrhoeic adolescents scored significantly lower in physical functioning, role performance, vitality, and social functioning. Thirty-one (36%) in the oligo/amenorrhoeic group satisfied the diagnostic criteria for polycystic ovarian syndrome. This subgroup had the lowest quality of life scores when compared with all other non–polycystic ovarian syndrome adolescents in the cohort.

Conclusion:
Oligo/amenorrhoea apparently had the strongest negative impact on the quality of life scores as compared to other menstrual problems. Those with polycystic ovarian syndrome appeared to have the lowest scores in the cohort.
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Introduction

Menstrual dysfunction commonly occurs in young females in their late adolescent period and early twenties[1-3]. Irregular periods with variable cycle lengths appear to be the most commonly encountered pattern, with irregular ovulation and variable amount of flow depending on whether ovulation has actually occurred in that particular cycle[3]. Associated pain symptoms

with abdominal cramps commonly labelled as primary dysmenorrhoea increased progressively in the subsequent

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years following menarche[4]. Oligomenorrhoea and amenorrhoea is another frequently encountered form of dysfunctional menstrual pattern in this age-group. One of the most common causes of oligomenorrhoea and amenorrhoea in these young women is irregular ovulation associated with irregular gonadotrophin cycles from the hypothalamic pituitary axis[5]. This irregular ovulatory pattern could also be induced by strenuous exercises, such as in athletes, gymnasts or dancers[6,7], or secondary to severe eating disorders[8]. In addition, polycystic ovarian syndrome (PCOS) commonly presents in young females with similar patterns of oligo/amenorrhoea[9].

The concerns or worries of these young women about their menstrual problems may be different, depending on their knowledge of menstrual physiology, their interpretation of the probable aetiology of the menstrual dysfunction, as well as their personal beliefs, acceptance, and cultural background. The objective of this study was to evaluate whether the standard quality of life (QOL) scores would be different for young women with oligo/amenorrhoea or dysmenorrhoea as compared to those with normal menstruation, and in addition, to assess whether such scoring would differ significantly in those with PCOS. The Medical Outcomes Survey 36-item short-form health survey (SF-36) developed by Ware et al[10] is the most commonly used health-related QOL measure used worldwide[11-13]. There were good established evidence supporting its validity, reliability, acceptability, discriminatory power and sensitivity on a variety of patient groups, from aged populations to pregnant women to those with specific medical problems[14-17]. The SF-36 is generic and can be applied to persons with different health conditions[10]. The SF-36 has been translated and tested in over 40 countries and general norming surveys have been completed in over 13 countries[18]. A Chinese (Hong Kong) version of the SF-36 was developed and tested in a pilot study in 1996[19], and norming studies have been done locally as well[20]. Since then, the Chinese version has been adapted for use in different scenarios and clinical conditions, and its acceptability, feasibility, conceptual validity and construct validity have been confirmed. We have thus utilised the SF-36 as a tool for measurement in this study.

Methods

Consecutive adolescents between the age of 15 and 20 years presenting to the adolescent gynaecology clinic of a general district hospital because of menstrual or non-menstrual problems were recruited over an 18-month period. These young women were referred to the clinic from either their primary health practitioners, school health services or the paediatric and adolescent physicians within the same hospital. The menstrual problems were classified according to their chief complaints into three main groups: dysmenorrhoea, oligo/amenorrhoea, and dysfunctional uterine bleeding. When significant dysmenorrhoea co-existed with menstrual cycle disturbance, dysmenorrhoea would be taken as the chief complaint. Oligomenorrhoea was defined as mean cycle lengths of 43 to 90 days irrespective of the amount of flow in the past 12 months, in accordance with previous study protocols used in the department[21], while secondary amenorrhoea was defined as no menstruation for over 90 days for any period of time over the reported 12 months before presenting to the clinic. The dysfunctional uterine bleeding group included all those with cycle irregularities that did not fit into oligo/amenorrhoea, as well as those that complained of relative menorrhagia or polymenorrhoea. Patients with chief complaints that were non-menstrual–related, such as vaginal discharge, infections, pruritis vulva, and who were verified from their history to be eumenorrhoeic and without significant dysmenorrhoea, were taken as controls. Those with complaints related to contraception or pregnancy were excluded from the study. Patients with significant medical or psychiatric disorders or those who were on long-term medical treatment such as epilepsy or asthma were also excluded, as such chronic illnesses by themselves were likely to have significant impacts on their QOL scoring. Consent was obtained from the adolescents when they were invited to fill in the questionnaires.

All recruited subjects were instructed to fill in a structured questionnaire that collected data on their detailed menstrual dysfunction, drug history, and significant health histories. All subjects were asked about their menstrual patterns in the past 12 months and factors that might influence menstrual function. They were also instructed to fill in a Chinese (HK) version of the SF-36. The scores were calculated using a standard SF-36 Health Outcomes Scoring Software (Lincoln, RI, USA).

To evaluate the cause of menstrual dysfunction,

appropriate investigations were performed as clinically indicated. In oligo/amenorrhoeic subjects, investigations included pregnancy tests when dictated by history, a hormone profile comprising basal follicle-stimulating hormone, luteinising hormone, prolactin and testosterone levels, and ultrasound examination to define ovarian morphology. Care was taken to have blood samples taken within the first week from their last menstrual period, except for those with prolonged oligomenorrhoea or amenorrhoea when the blood was taken at random. The diagnosis of polycystic ovaries was based on the presence of oligomenorrhoea or amenorrhoea together with ultrasound features of polycystic ovaries, in accordance with the new Rotterdam consensus on the diagnostic criteria of PCOS[9].

Recruitment of a sample size of around 100 subjects with menstrual dysfunction and around 50 controls with no menstrual problems was aimed for. Studies on the reliability and precision of the SF-36 showed that such a sample size would also be adequate to show a 10-point difference between a group and a fixed norm[10]. To increase the sensitivity of our comparison, it was decided to use absolute subscale scores for analysis, and such a sample size would be adequate to detect significant differences of 3-5 points in individual domains, based on the same range of variance in scores documented from our previous studies.

Data were analysed using the Statistical Package for the Social Sciences version 14.0 (SPSS, Chicago, IL, USA). Statistical analysis was performed using Student's *t* tests, as well as one-way analysis of variance (ANOVA) to compare the three menstrual groups, with post-hoc multiple comparisons by Bonferroni methods between the different individual groups as appropriate. A p value of <0.05 was considered significant.

Results

Of a total of 295 adolescents recruited, 60 were classified as eumenorrhoeic controls, while 235 had menstrual problems as their chief complaint. Within the study group, 43 (18.2%) had dysmenorrhoea, 86 (36.5%) had oligo/amenorrhoea and the rest 106 (45.1%) complained of irregular menstrual bleeding or menorrhagia. The mean age of the cohort was 17.3 years. There were no significant differences in the mean age, height or body mass index between the study and

Table 1. The Medical Outcomes Survey SF-36 domains

Health component scale	Item content
Physical functioning	Degree of limitation of physical activity
Role: physical	Health-related problems with work or daily activity
Bodily pain	Intensity of pain/extent of pain interfering with normal work
General health	Evaluation of personal health
Vitality	Level of energy/degree of fatigue
Social functioning	Extent/frequency of health problems interfering with social activities
Role: emotional	Mood assessment
Mental health	Rating of health now compared with 1 year ago

control groups, nor between the different groups with menstrual dysfunction. The linear subscale scores of each of the eight domains of the SF-36 (Table 1) were used in the analysis, the scores having a range of 0-100 with higher scores representing better health status or functioning. Physical component summary score and mental component summary score were calculated by summation of the original population standardised domain scores, in which a value of 50 would indicate a score equivalent to the population mean[10].

The menstrual dysfunction group had marginally higher body mass index as compared to the control group (Table 2), and had significantly lower QOL scores in the domains of general health (GH) [p=0.025], social functioning (SF) [p=0.03], as well as in the physical and mental summary scores (p=0.002 and p=0.003). Within the menstrual dysfunction group, the dysmenorrhoeic subjects had particularly lower scores in the domain of bodily pain compared to the other two groups (50 vs 59.5 and 61.3, p=0.01 by one-way ANOVA) [Table 3]. The oligo/amenorrhoeic adolescents scored lower than the other two groups in physical functioning (PF) [81.6 vs 89.8 and 85.7, p=0.002 by ANOVA], role performance (RP) [82 vs 93.3 and 87.7, p=0.035 by ANOVA], vitality (VT) [42.1 vs 52.1 and 53.5, p=0.001 by ANOVA], and

Table 2. Comparison of quality of life scores between eumenorrhoeic controls and subjects with menstrual dysfunction

	Study group (n=235) [SD*]	Control group (n=60) [SD]	p value; MD* (95% confidence interval)
Age (years)	17.3 (1.04)	17.3 (0.78)	0.76; -0.04 (-0.33 to 0.24)
Height (cm)	158 (7.4)	160 (4.1)	0.01; -2.47 (-4.44 to -0.51)
Weight (kg)	49.1 (5.18)	48.9 (3.54)	0.78; 0.19 (-1.20 to 1.59)
Body mass index (kg/m²)	19.7 (2.66)	19 (1.7)	0.04; 0.74 (0.02 to 1.45)
Physical functioning	85 (12.9)	85.5 (12.8)	0.79; -0.5 (-4.18 to 3.18)
Role: physical	86.6 (24.1)	87.1 (23.8)	0.89; -0.45 (-7.30 to 6.40)
Bodily pain	58.6 (21)	64.2 (21.7)	0.06; -5.58 (-11.6 to 0.43)
General health	59.6 (19.6)	66.2 (21.7)	0.025; -6.54 (-12.2 to -0.83)
Vitality	49.1 (15.1)	52.3 (13.0)	0.13; -3.2 (-7.41 to 1.0)
Social functioning	71.0 (20.8)	77.6 (21.8)	0.03; -6.59 (-12.5 to -0.63)
Role: emotional	61.5 (35)	63.6 (34)	0.67; -2.11 (-12.0 to 7.82)
Mental health	61.9 (16.4)	62.0 (16.9)	0.86; -0.40 (-5.1 to 4.29)
Physical summary score	52.1 (7.1)	55.4 (7.08)	0.002; -3.28 (-5.31 to -1.24)
Mental summary score	42.0 (10)	46.4 (9.8)	0.003; -4.34 (-7.18 to -1.50)

* SD denotes standard deviation, and MD mean difference

social functioning (SF) [66.5 vs 80.1 and 71.0, p=0.002 by ANOVA]. When comparing the oligo/amenorrhoeic group with the dysmenorrhoea group only, the differences in these parameters remained statistically significant. When comparing the oligo/amenorrhoeic group and the 'other dysfunctional bleeding' group only, VT scoring still remained significantly lower with p=0.001. In addition, the oligo/amenorrhoeic group had a significantly lower mean physical summary composite score (51 vs 54.8 and 52, p=0.019 by ANOVA) as well as mean mental summary composite score (39.6 vs 43.6 and 43.5, p=0.015 by ANOVA).

Table 3. Comparison of SF-36 mean domain scores between dysmenorrhoeic, oligo/amenorrhoeic, and other menstrual dysfunctional groups

	I: Dysmenorrhoea (n=43) [SD*]	II: Oligo/amenorrhoea (n=86) [SD]	III: Other dysfunctional bleeding (n=106) [SD]
Age (years)	17.3 (1.11)	17.2 (1.06)	17.4 (0.99)
Height (cm)	158.5 (5.3)	158.6 (7.3)	157.2 (7.48)
Weight (kg)	48.5 (4.9)	49.9 (6.46)	48.6 (3.42)
Body mass index (kg/m²)	19.4 (2.86)	19.9 (3.18)	19.7 (2.08)
Physical functioning	89.8 (7.03)	81.6 (15.2)	85.7 (12)
Role: physical	93.3 (20.4)	82 (23.9)	87.7 (25.1)
Bodily pain	50 (16.7)	59.5 (22.1)	61.3 (20.8)
General health	62.0 (19.1)	57.9 (20.3)	60.1 (19.1)
Vitality	52.1 (12.5)	42.1 (15.6)	53.5 (13.7)
Social functioning	80.1 (18.2)	66.5 (20.8)	71.0 (20.8)
Role: emotional	65.1 (32)	58.3 (36.1)	62.6 (35.4)
Mental health	62.8 (16)	59.5 (17.1)	63.4 (15.8)
Physical summary score	54.8 (5.15)	51 (8.6)	52 (6.3)
Mental summary score	43.6 (10.2)	39.6 (10.4)	43.5 (9.23)

* SD denotes standard deviation, ANOVA analysis of variance, and MD mean difference

In the group with oligo/amenorrhoea, 31 (36%) satisfied the diagnostic criteria for PCOS, while the rest were ascribed to hypothalamic dysfunction. Hyper-prolactinaemia or thyroid disorders were not found in this cohort.

When compared to the rest of the cohort, the subgroup with PCOS had higher body weight (55.2 kg, SD 6.33 vs 48.1 kg, SD 4.29; p=0.001) and body mass index (22.0 kg/m^2, SD 3.58 vs 19.4 kg/m^2, SD 2.33; p=0.001) [Table 4]. In addition, the PCOS subjects scored significantly lower in various physical and mental domains including PF, RP, VT and SF as compared to all other non-PCOS adolescents in the cohort. Moreover, when compared to other non-PCOS oligo/amenorrhoeic adolescents, this PCOS group still scored significantly lower in PF, VT and SF domains.

Discussion

The SF-36 is a generic QOL questionnaire that could be applied to different health conditions and has been used commonly for assessing treatment outcomes to chronic medical conditions. Despite its widespread use in many conditions, the use of this questionnaire to assess menstrual dysfunction in adolescents has not been described before[11]. It thus remains arguable whether the SF-36 could sensitively detect the impact to health perception with reference to menstrual symptoms. We have recently used SF-36 to assess different groups of adolescents with oligo/amenorrhoea due to different aetiologies, and were able to demonstrate significant differences in scoring in groups with different clinical causes[22]. Disease-specific questionnaires for assessing QOL have now also been specifically developed for menstrual problems such as those secondary to inherited bleeding disorders[23] or for polycystic ovarian diseases[24,25]. The results of the current study showed that detectable differences could be seen using the SF-36 in adolescents with a wide range of menstrual symptoms.

Our present data demonstrated that there was an overall negative impact on the QOL scores in adolescents with menstrual symptoms, with significantly lower scores in the domains of general health and social functioning. As QOL scores are a reflection of the perceived problems and concerns of the subjects being assessed, it is logical to assume that the domains, which would be negatively affected, would depend to a large extent on the knowledge, attitudes and consequences of menstrual health among these adolescents[26]. Within the menstrual dysfunction group, the findings of lower scores in the bodily pains domain among those with dysmenorrhoea also appeared logical. However, this group actually had best scores among the three categories of menstrual dysfunction, which might signify that these adolescents would accept

ANOVA*		I vs II	I vs III	II Vs III
F	p value	p value; MD* (95% confidence interval)	p value; MD (95% confidence interval)	p value; MD (95% confidence interval)
0.45	0.63	1.0; 0.12 (-0.35 to 0.59)	1.0; -0.002 (-0.48 to 0.43)	1.0; -0.14 (-0.50 to 0.22)
0.90	0.40	1.0; -0.09 (-3.45 to 3.26)	1.0; 1.25 (-2.0 to 4.5)	0.64; 1.35 (-1.26 to 3.96)
1.71	0.18	0.47; -1.37 (-3.70 to 0.96)	1.0; -0.10 (-2.35 to 2.15)	0.27; 1.26 (-0.54 to 3.07)
0.50	0.60	0.95; -0.49 (-1.70 to 0.70)	1.0; -0.29 (-1.46 to 0.87)	1.0; 0.20 (-0.73 to 1.14)
6.45	0.002	0.002; 8.26 (2.56 to 13.97)	0.22; 4.11 (-1.4 to 9.64)	0.075; -4.14 (-8.58 to 0.28)
3.39	0.035	0.036; 11.3 (0.53 to 22.07)	0.59; 5.59 (-4.82 to 16.0)	0.30; -5.7 (-14 to 2.66)
4.72	0.01	0.043; -9.54 (-18.86 to -0.22)	0.008; -11.32 (-20.34 to -2.3)	1.0; -1.77 (-9.01 to 5.46)
0.65	0.52	0.81; 4.03 (-4.8 to 12.87)	1.0; 1.88 (-6.68 to 10.44)	1.0; -2.15 (-9.02 to 4.71)
16.2	0.001	0.001; 9.96 (3.53 to 16.39)	1.0; -1.40 (-7.63 to 4.81)	0.001; -11.37 (-16.37 to -6.37)
6.37	0.002	0.001; 13.6 (4.41 to 22.79)	0.043; 9.08 (0.19 to 17.97)	0.38; -4.51 (-11.65 to 2.62)
0.62	0.53	0.91; 6.74 (-9.06 to 232.55)	1.0; 2.48 (-12.81 to 17.79)	1.0; -4.25 (-16.53 to 8.02)
1.47	0.23	0.83; 3.32 (-4.04 to 10.69)	1.0; -0.63 (-7.76 to 6.50)	0.29; -3.95 (-9.68 to 1.77)
4.05	0.019	0.015; -3.73 (0.55 to 6.91)	0.087; -2.8 (-0.27 to 5.88)	1.0; -0.92 (-3.4 to 1.54)
4.29	0.015	0.098; -3.96 (-0.48 to 8.41)	1.0; 0.066 (-4.23 to 4.37)	0.021; -3.89 (-7.35 to -0.44)

Table 4. Comparison of SF-36 mean domains between polycystic ovarian syndrome (POCS) and non-PCOS oligo-amenorrhoeic subjects

	PCOS (n=31) [SD*]	Non-PCOS oligo/ amenorrhoeic (n=55) [SD]	p value; MD (95% confidence interval)	All non-PCOS (n=204) [SD]	p value; MD* (95% confidence interval)
Age (years)	17.4 (1.12)	17.1 (1.03)	0.28; 0.2 (-0.22 to 0.73)	17.3 (1.03)	0.65; 0.09 (-0.30 to 0.49)
Height (cm)	159 (6.83)	158 (7.62)	0.67; 0.69 (-2.59 to 3.97)	157 (7.54)	0.39; 1.23 (-1.6 to 4.06)
Weight (kg)	55.2 (6.33)	46.9 (4.22)	0.001; 8.37 (6.1 to 10.64)	48.1 (4.29)	0.001; 7.11 (5.36 to 8.86)
Body mass index (kg/m^2)	22.0 (3.58)	18.8 (2.23)	0.001; 3.22 (1.97 to 4.46)	19.4 (2.33)	0.001; 2.58 (1.62 to 3.54)
Physical functioning	76 (12.3)	84.7 (15.9)	0.01; -8.68 (-15.27 to -2.08)	86.3 (12.5)	0.001; -10.29 (-15 to -5.5)
Role: physical	77 (15.4)	84.8 (27.4)	0.15; -7.70 (-18.35 to 2.94)	88.1 (24.9)	0.018; -11.02 (-20.1 to -1.93)
Bodily pain	59.2 (18)	59.7 (24.3)	0.92; -0.47 (-10.43 to 9.48)	58.5 (21.4)	0.85; 0.74 (-7.25 to 8.74)
General health	53.3 (18.3)	60.5 (21.1)	0.11; -7.19 (-16.21 to 1.82)	60.6 (19.6)	0.054; -7.27 (-14.6 to 0.13)
Vitality	35.4 (15.3)	45.9 (14.7)	0.003; -10.46 (-17.13 to -3.78)	51.2 (14)	0.001; -15.71 (-21.12 to -10.3)
Social functioning	56.9 (12.4)	72 (22.6)	0.001; -15.09 (-23.87 to -6.31)	73.2 (21)	0.001; -16.33 (-23.99 to -8.68)
Role: emotional	55.1 (16.2)	60.2 (16.2)	0.54; -5 (-21.18 to 11.17)	62.5 (14.8)	0.27; -7.32 (-20.6 to 5.98)
Mental health	58.6 (19.7)	60 (15.6)	0.73; -1.34 (-9.02 to 6.34)	62.4 (15.8)	0.23; -3.74 (-9.96 to 2.48)
Physical summary score	53.1 (7.98)	49.9 (8.78)	0.92; 3.25 (-0.54 to 7.05)	52 (7)	0.41; 1.12 (-1.59 to 3.84)
Mental summary score	38.1 (11.9)	40.4 (9.47)	0.33; -2.26 (-6.91 to 2.39)	42.7 (9.58)	0.019; -4.52 (-8.29 to -0.76)

* SD denotes standard deviation, and MD mean difference

their dysmenorrhoeic symptoms as a natural part of their menstrual dysfunction and their womanhood[27].

From our data, oligo/amenorrhoeic adolescents scored lower in more domains (PF, RP, VT, SF) as well as in the summative physical and mental component scores as compared to those with dysmenorrhoea or menstrual irregularities, these differences being more apparent between the dysmenorrhoea group than the menstrual irregularities group. Paradoxically, one would expect that in terms of symptoms or general health issues, dysmenorrhoea or menstrual irregularities would have been interpreted as more serious, while oligo/amenorrhoea would be of least concern to these young women. This suggested that the adolescents surveyed in this study, who presented themselves to our clinic for assessment because of this menstrual symptom, would likely view oligo/amenorrhoea as an important pathological condition quite apart from the symptoms involved. Our previous data studying menstrual dysfunction and associated QOL scores between dancers and non-dancers also showed that dancers would likely accept oligo/amenorrhoea as part of their intensive physical training and thus were less concerned than non-dancers or might not regard the problem as pathological at all[22]. Thus, the young women's self-interpretation of the menstrual symptoms appears to play an important role on their QOL scores. Qualitative psychological

studies have shown that young women often have preset stereotypes of their menstrual experience[28], and deviations from their stereotypes would be interpreted as pathological. Indeed, as the subjects in this study were recruited from an adolescent clinic, one could argue that the results could be different for adolescents with the same oligo/amenorrhoeic patterns who did not present themselves for medical care.

Around one-third of the oligo/amenorrhoeic subjects in our data could be diagnosed as suffering from PCOS. There is abundant literature to demonstrate that individuals with PCOS suffered excess psychological stress[24,25] and even psychiatric morbidity. These PCOS individuals were reported to have higher levels of depression, psychological and psychosexual morbidity, and an increased response to stress, together with low self-esteem, decreased social activity and less romantic contentment[25]. In adult women with PCOS, weight and hirsutism and acnes consistently caused more concern than menstrual problems or infertility[29,30], and associated symptoms of diabetes mellitus and obstructive sleep apnoea were all reported to reduce health-related QOL scores[25]. While we have not further assessed any

causal linkage between obesity and QOL scores in this subgroup, our data clearly demonstrated that even among oligo/amenorrhoeic adolescents, the PCOS group appeared to have the lowest scores in various domains with a significantly higher body weight and body mass index. Our findings are compatible with an increase in psychological stress and decrease in health-related QOL in these PCOS adolescents.

In summary, our results showed that there were demonstrable negative effects on the perceived QOL in young women suffering from menstrual problems. In particular, such negative effects were apparently more significant in those with oligo/amenorrhoea, and worse in the subgroup with a diagnosis of PCOS. Such findings should be taken into clinical consideration during the counselling and management of adolescent menstrual dysfunction and careful explanation of the underlying pathophysiology of their menstrual problems should be given to allow the adolescents to have a realistic perception of their problems. The appropriate support that should be offered to those with lowest scores in their QOL, such as those with PCOS, needs further evaluation.

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