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Authors: Tuba Kolaylı, Aycan Çakmak Reyhan

Tuba Kolaylı - 0000-0002-2906-6332
Aycan Çakmak Reyhan - 0000-0002-8479-3858

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Relationship Between Physical Activity Levels and Psychosocial Factors Affecting Pain Perception in Pregnant Women with Lumbopelvic Pain

Tuba Kolaylı[1,A-D,F], Aycan Çakmak Reyhan[2,A,D-F]

[1]T.C. Uskudar University, Istanbul, Turkey
[2]Istanbul Bilgi University, Istanbul, Turkey

Abstract

Introduction
In pregnant women with lumbopelvic pain (LPP), engaging in physical activity during pregnancy has many positive effects on both maternal and infant health. Various factors influence the level of physical activity, making it essential to analyze these factors during periods marked by notably changes in women's lives, such as pregnancy. This study aims to explore the relationship between pregnancy-related psychosocial factors and distress, catastrophizing, and pain self-efficacy, which affect pain perception, and the physical activity levels in pregnant women with LPP.

Material and methods
The study was conducted with 60 pregnant women aged 20-36 who were in the second or third trimester and had lumbopelvic pain lasting more than 1 week. The surveys were delivered to the participants electronically. Antenatal Psychosocial Health Assessment Scale, Tilburg Pregnancy Distress Scale, Pain Catastrophizing Scale, and Pain Self-Efficacy Questionnaire were used. The Pregnancy Physical Activity Questionnaire was used to measure the physical activity levels in pregnant women.

Results
No significant correlation was found between pregnancy-related psychosocial factors ($p = 0.787$), pregnancy-related distress ($p = 0.295$), catastrophizing ($p = 0.150$), and pain self-efficacy ($p = 0.153$), and the levels of physical activity.

Conclusions
No significant relationship was found between psychosocial factors that have been shown to have an impact on pain perception in pregnant women with LPP and their physical activity levels. This shows that psychosocial factors are not an effective barrier to the physical activity levels of pregnant women with LPP and that other factors should be questioned to increase physical activity levels.

Keywords: Pregnancy, Physical activity, Catastrophizing, Self efficacy, Pelvic pain

***Correspondence:** Tuba Kolaylı, T.C. Uskudar University, Istanbul, Turkey; email: tubakolayli@gmail.com

Introduction

Pregnancy is a period marked by numerous changes in the female body to meet the needs of both the mother and the infant. During pregnancy, vascular and hormonal changes occur, leading to increased joint laxity and postural changes [1-3]. The physiological effects of these changes are seen in various body systems, including the musculoskeletal, endocrine, cardiovascular, and renal systems [1,4]. Notably, changes in the musculoskeletal system have been reported to cause lumbopelvic pain (LPP) in pregnant women.

LPP is a common condition encountered during pregnancy, affecting 50% of women, with 25% continuing to experience pain after delivery [5]. Pregnancy-related LPP is defined as pain that occurs between the 12th rib and the gluteal sulcus and in the region surrounding the symphysis pubis, lasting for >1 week [6-8]. Although the etiology of LPP remains unclear, various physical and psychosocial factors have been implicated in its emergence [7,9,10].

There are hypotheses regarding the formation mechanism of LPP during pregnancy. The first of these is hormonal changes. Levels of relaxin, estrogen and progesterone hormones vary in women from the beginning of pregnancy to birth. It is thought that it may indirectly cause biomechanical changes, especially by affecting ligament laxity. Current evidence suggests that these hormones may influence LPP but cannot be the sole cause [11]. Pregnancy-induced neuromuscular adaptations are also thought to be related to LPP. Findings such as decreased endurance in the pelvic floor muscles and increased muscle activation in the erector spinae support this hypothesis, but further studies are needed on this subject. Biomechanical factors such as changes in the kyphosis and lordosis structure seen with the increase in the weight of the baby and changes in the position of the pelvis are also among the hypotheses that are assumed to cause LPP formation [12].

Pregnancy-related LPP not only reduces women's quality of life but also makes it difficult for pregnant women to perform their daily activities, resulting in decreased physical activity levels among pregnant women with LPP [8,13,14]. LPP generally worsens as pregnancy progresses. Additionally, increased pain intensity is associated with higher disability in women with LPP [13]. A study conducted with Norwegian women revealed the association between LPP and sick leave in pregnant women [15]. During this period, pain makes it difficult for pregnant women to perform almost all daily activities. It affects many daily activities, especially carrying loads, walking, cleaning, working, entertainment and traveling comfortably in a car [9]. LPP reduces the health-related quality of life of pregnant women due to its effects on walking, working, sleep, and mood [16].

The pain in lumbopelvic area starts at 18th gestational week of pregnancy and generally peaks between the 24th- 36th weeks [17]. Given the consequences of LPP, understanding the factors influencing pain perception is crucial for effective pain management in pregnant women. When viewed from a biopsychosocial perspective, pain is recognized as a complex experience involving cognitive, sensory, and emotional components. Psychosocial factors such as distress, catastrophizing, and self-efficacy affect pain perception [18-20]. Recent studies have shown that pregnant women with LPP have impaired body perception, which is associated with a more intense perception of pain [21]. In addition, factors affecting pain perception, such as self-efficacy in the management of chronic pain, can cause catastrophization and negatively affect pain management [22].

It is reported that physical activity during pregnancy has positive effects on both maternal and fetal health. Regular physical activity during pregnancy is linked to a lots of benefits, including a reduced risk of gestational diabetes, hypertensive disorders, excessive weight gain and retention postpartum, among other advantages [23]. However, a decrease in the level of physical activity is often observed during pregnancy due to factors such as inadequate education, socioeconomic level and false popular beliefs about exercising during pregnancy. Gashaw et al demonstrate that approximately more than half of women with LPP have moderate to severe activity limitation [24]. Sedentary pregnant women who do not have any complications should be encouraged to do physical activity for a healthy life [25,26]. Additionally, lack of exercise during mid-pregnancy has also been associated with an increased incidence of low back pain (LBP) or pelvic girdle pain (PGP) in late pregnancy [12].

While the current literature includes studies investigating pregnancy-related LPP from a biopsychosocial perspective [6,27,28] and studies examining physical activity levels during pregnancy [12,29,30], studies evaluating the relationship between psychosocial factors affecting LPP and physical activity levels, there is a notable gap. Considering the positive effects of physical activity on pregnant women before, during and after birth, it is necessary to plan practices to increase the physical activity levels of pregnant women. The fact that pregnant women with LPP are at risk for low physical activity requires other factors to be taken into consideration during planning. Therefore, this study aims to investigate the relationship between psychosocial factors affecting pain perception and physical activity levels in pregnant women with LPP.

Materials and methods

Participants

This cross-sectional, descriptive study was conducted at Uskudar University Physiotherapy and Rehabilitation Research Center, but there was also an online environment option for pregnant women who chose not to visit a center due to the COVID-19 pandemic. Of the 65 pregnant women with LPP reached within the research center, 60 participants were accepted to the study. Based on Cohen's effect size coefficients, assuming an expected effect size (d = 0.5), the sample size was determined as 60 when the power was calculated as 0.8.

Inclusion criteria were women aged 18–45 years, who had experienced LPP for >1 week, rated pain between 1 and 10 on the Visual Analogue Scale, could read and understand Turkish, were in the second or third trimester of pregnancy, and did not engage in regular exercise before pregnancy. Exclusion criteria included pregnancy complications (such as preeclampsia, pregnancy-related hypertension, and diabetes), gynecological or urological problems leading to pain during pregnancy, and a history of acute or chronic diseases, surgical interventions, or trauma to the musculoskeletal or nervous system. The diagram of the participants is shown in Fig. 1.

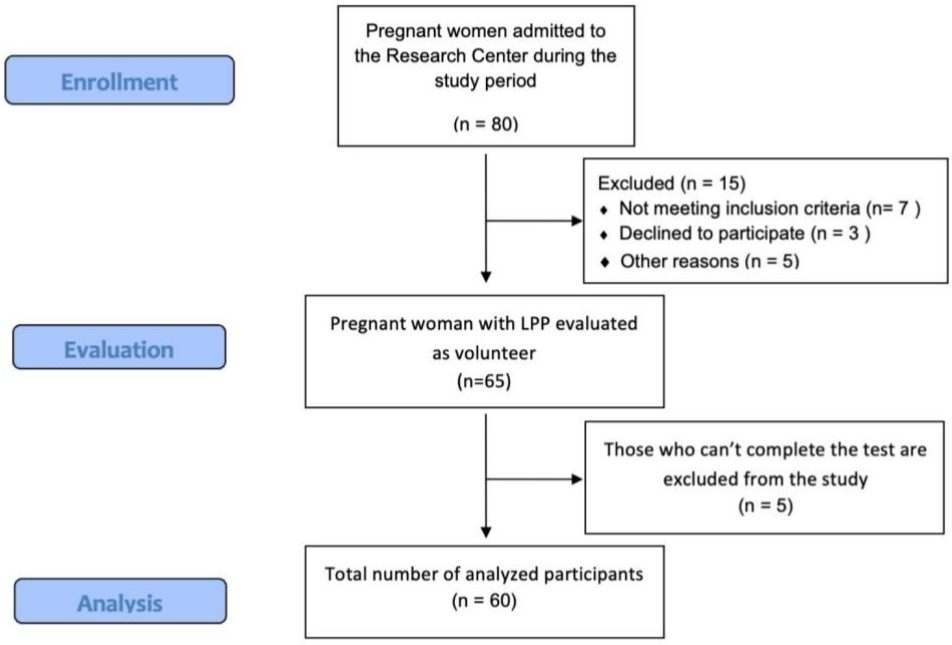

Fig. 1. Study flow chart

Procedures

The surveys used in this study were delivered to the participants electronically. Pregnant women who met the inclusion criteria and agreed to participate voluntarily were informed about the study. Then, written informed consent form for the study was obtained from the participants. Participants' responses to the surveys sent via e-mail were collected using Google Forms. Participants were instructed to read and respond appropriately to assessment forms including the

Antenatal Psychosocial Health Assessment Scale (ALPHA), Tilburg Pregnancy Distress Scale (TPDS), Pain Catastrophizing Scale (PCS), Pain Self-Efficacy Questionnaire (PSEQ), and Pregnancy Physical Activity Questionnaire (PPAQ). Since pregnant women did not want to participate in face-to-face evaluation during the Covid 19 period, the interviews were continued online, like other publications in the literature [31,32]. The study adhered to the Principles of the Declaration of Helsinki [33]. This study approved by Uskudar University Non-Interventional Ethics Committee (No: 61351342).

Outcome Measures

ALPHA was used to evaluate the psychosocial states of the pregnant women participating in the study. Developed by Yıldız in 2011 [34], ALPHA consists of 46 items on a 5-point Likert scale. The scale's validity and reliability were confirmed in Yıldız's original study with a Cronbach's alpha of 0.93, indicating high internal consistency. The survey yields a score ranging from 46 to 230, and the total score is divided by the number of items to obtain an average value, which is graded between 1 and 5. The interpretation for pregnant women included in the assessment was as follows: 1 = very poor psychosocial health, 5 = very good psychosocial health [35].

Subsequently, TPDS was used to determine the distress states of pregnant women. Developed by Pop et al. in 2011, TPDS assesses distress during pregnancy and includes 16 items. It is an important scale since it involves spouse participation in addition to negative emotions. TPDS employs a 4-point Likert scale for each item [36]. The Turkish validity and reliability study of the scale was conducted by Çapık et al. in 2015 confirmed the scale's validity and reliability, reporting a Cronbach's alpha of 0.83 [37].

The level of pain catastrophizing was a parameter to be evaluated in pregnant women participating in this study, and thus, PCS was employed. Developed by Sullivan et al. in 1995, PCS assesses individuals' exaggerated and negative mental responses during pain experiences, i.e., their levels of catastrophizing. Comprising 13 items, including the feelings and opinions of individuals about their last pain experience, each item is evaluated on a scale from 0 to 4 (0: never, 4: always) [38]. A high score indicates a high level of pain catastrophizing [39]. The Turkish validity and reliability study of PCS was conducted in 2017 reported a Cronbach's alpha of 0.95 [40].

PSEQ was applied to participating pregnant women. This scale was created by M.K. Nicholas in 1989 to assess individuals' confidence in performing activities while experiencing pain [19]. It consists of 10 items, each assessed on a 7-point Likert scale. The highest possible

score is 60, with higher values indicating more self-efficacy in accomplishing functionality despite pain. The Turkish validity and reliability study of PSEQ was conducted by Kaynarcı in 2016 reported a Cronbach's alpha of 0.95 [41].

PPAQ was used to determine the physical activity levels of pregnant women. Created by Chasan-Taber in 2004, PPAQ evaluates the intensity, frequency, and duration of physical activity during pregnancy using 32 items that cover housework/caregiving activities, professional activities, sports/exercise activities, transportation activities, and inactivity. The average amount of energy spent on daily activity is calculated as "MET-hours/week" at the end of the evaluation. The Turkish validity and reliability study of PPAQ was performed by Çırak et al. in 2015 confirmed the scale's reliability with a Cronbach's alpha of 0.82 [42,43].

Statistical Analysis

Data analysis was conducted using the SPSS 25.0 program. Descriptive statistics, including mean and standard deviation values, were employed to summarize data. Spearman's correlation analysis was performed to investigate the relationship between the collected data. The significance level was considered as $P < 0.05$ for all analyses conducted in the study.

Results

60 pregnant women between the ages of 20 and 36 participated in the study. Among the pregnant women, 61.7% (n = 37) were employed, whereas 38.3% (n = 23) were homemakers. Regarding the trimester of pregnancy, 31.7% (n = 19) were in the second trimester, and 68.3% (n = 41) were in the third trimester. The descriptive characteristics of the participants are presented in Table 1.

Tab. 1. Participants' descriptive characteristics

Age	**X**	**SD**
n = 60	28.67	3.32
Employment status	**n**	**%**
Employed	37	61.70
Unemployed	23	38.30
Week of Gestation	**n**	**%**
3–6 months (2nd trimester)	19	31.70
6–9 months (3rd trimester)	41	68.30
Number of Pregnancies	**n**	**%**
1st pregnancy	35	58.30

2nd pregnancy	15	25.00
3rd pregnancy	5	8.30
4th pregnancy and above	5	8.30

n - number of pregnant women with LPP.

When evaluating the physical activity levels of pregnant women based on MET-hours per week, the lowest value for physical activity was 47.25 MET-hours/week, and the highest value was 595.3 MET-hours/week. The mean energy expenditure by pregnant women was 235.7 MET-hours/week. The activity with the highest level of physical activity was "housework and caregiving activities" (145.0 MET-hours/week), whereas the activity with the lowest level of physical activity was "severe activity" (1.6 MET-hours/week) (Table 2).

Tab. 2. Descriptive findings on physical activity levels and activity levels in different types of physical activities during pregnancy

PPAQ (MET-hours/week)	**n**	**Mean**	**SD**	**Min**	**Max**
Total physical activity	60	235.70	123.90	47.25	595.30
Sedentary activity	60	49.50	37.90	0.28	202.30
Mild activity	60	107.60	51.50	17.50	301.50
Moderate activity	60	95.10	101.10	0.80	556.70
Severe activity	60	1.60	4.20	0.00	21.50
Housework/caregiving activities	60	145.00	101.80	13.13	398.00
Professional activities	60	21.50	68.00	0.00	483.00
Sports/exercise activities	60	5.90	10.90	0.00	56.20

Max - maximum, Min - minimum, n - number of pregnant women with LPP, PPAQ - Pregnancy Physical Activity Questionnaire, SD - standard deviation.

Psychosocial health, pregnancy-related distress, catastrophizing, and pain self-efficacy levels of pregnant women with LPP were evaluated as psychosocial factors affecting pain perception (Table 3).

Tab. 3. Evaluation results of the pain score and psychosocial factors affecting pain perception

Pain Score	**Assessment Scale**	**n**	**Mean**	**SD**	**Min**	**Max**
Pain	VAS	60	5.80	1,82	2	9
Psychosocial factors affecting pain perception	**Assessment Scale**	**n**	**Mean**	**SD**	**Min**	**Max**
Pregnancy-related psychosocial health	ALPHA	60	3.78	0.50	2.50	4.80

Pregnancy-related distress	TPDS	60	26.90	7.61	3.00	40.00
Catastrophizing	PCS	60	14.60	10.70	0.00	40.00
Pain self-efficacy	PSEQ	60	40.60	12.50	11.00	60.00

ALPHA - Antenatal Psychosocial Health Assessment Scale, Max - maximum, Min - minimum, n - number of pregnant women with LPP, PCS - Pain Catastrophizing Scale, PSEQ - Pain Self-Efficacy Questionnaire, SD - standard deviation, TPDS - Tilburg Pregnancy Distress Scale, VAS - Visual Analogue Scale.

When the relationship between psychosocial factors affecting pain perception and physical activity level was investigated, no statistically significant relationship was observed between pregnancy-related psychosocial health, pregnancy-related distress, catastrophizing, and pain self-efficacy values and physical activity levels (Table 4).

Tab. 4. Relationship between psychosocial factors affecting pain perception and physical activity levels during pregnancy

	r	**P**
ALPHA-PPAQ (MET-hours/week)	−0.820	0.534
TPDS-PPAQ (MET-hours/week)	−0.130	0.323
PCS-PPAQ (MET-hours/week)	0.222	0.088
PSEQ-PPAQ (MET-hours/week)	−0.221	0.090

Spearman's correlation analysis ($P < 0.05$). ALPHA- Antenatal Psychosocial Health Assessment Scale, P-significance coefficient, PCS - Pain Catastrophizing Scale, PPAQ - Pregnancy Physical Activity Questionnaire, PSEQ - Pain Self-Efficacy Questionnaire, r- correlation coefficient, TPDS - Tilburg Pregnancy Distress Scale.

A Spearman's correlation analysis was conducted to determine the relationship between the scores obtained from ALPHA and moderate physical activity, which is the type of physical activity. As a result, a statistically significant negative relationship was detected ($p<0.05$).

Tab. 5. The relationship between pregnancy psychosocial assessment scale scores and activity level in different types of physical activity

		Sedentary	**Light**	**Moderate**	**Vigorous**	**Household/ Caregiving**	**Occupational**	**Sports/ exercise**
ALPHA	**r**	-0,204	0,062	**-0,271***	-0231	0,100	-0,224	-0,193
	P	0,119	0,642	**0,042**	0,076	0,453	0,086	0,140
	n	60	60	**60**	60	60	60	60

ALPHA - Antenatal Psychosocial Health Assessment Scale, n - number of pregnant women with LPP, P - significance coefficient, r - correlation coefficient.

Discussion

The aim of this study is to investigate the relationship between psychosocial factors affecting pain perception and physical activity in pregnant women with LPP and to draw attention to the importance of physical activity in pregnant women with LPP who are at risk of decreasing physical activity levels. When studies in the literature are examined, it is seen that the number of publications containing the effects of psychosocial factors on pregnant women with LPP is increasing. However, there are no studies investigating the relationship of these factors with physical activity level. When the results of our study were examined, it was seen that there was no relationship between the physical activity level and psychosocial factors affecting pain perception in pregnant women with LPP.

The physical activity levels reported in our study were consistent with findings from other studies [43,44]. In our study, "housework and caregiving activities" were identified as making the most significant contribution to the weekly total physical activity, consistent with existing literature. This is followed by mild physical activity. This result is similar in pregnant women living in many different countries and cultures [45,46].

WHO recommends that pregnant women engage in regular physical activity of moderate intensity for at least 150 minutes per week [47]. According to the guide prepared by WHO in 2020, housework is shown as an important type of physical activity for pregnant women [48]. Notably, pregnant women's activity levels for "housework and caregiving activities" in our study were remarkably higher than those in other studies, whereas activity levels for "professional activities" were exceptionally low [44,49].

In a review, it was mentioned that pregnant women's exposure to occupational risks and inadequate pregnancy regulations may cause them to take leave sick leave [50]. In addition, pregnant women with higher distress levels have longer leave periods of sick leave [51]. Gutke et al. showed that there was a significant relationship between pain intensity, disability and sick leave in pregnant women with lumbopelvic pain [52]. All of these may be the reasons for the low professional activity levels of the pregnant women in our study. In addition, pregnant women's choice to quit their jobs due to Covid-19 may also be effective in this result [53].

Exercising by women during pregnancy has both safe and protective effects [23]. Exercise programs are effective on pain intensity and disability in pregnant women with LPP [8]. This study revealed that exercise and sports activities were lower in pregnant women with LPP compared to other types of physical activity. Altaş et al. reported that exercise and sports activities were low

during pregnancy, and factors such as lack of time, fatigue, and the burden of caring for other children caused this [29]. Physical activity sustained during pregnancy has positive effects on both maternal and fetal health. Therefore, improving the physical activity levels of pregnant women is important for the health of the pregnant woman and the baby [54].

During pregnancy, women undergo changes not only in the musculoskeletal system but also in their psychosocial well-being. Psychosocial factors play a role in influencing pain severity in individuals experiencing musculoskeletal issues. Pregnancy-related LPP has been linked to adverse effects on the psychosocial states of pregnant women [55]. Studies have indicated that psychosocial risk factors affect the physical activity levels in individuals [56,57]. A Canadian study of 70 pregnant women investigated the impact of psychosocial states on physical activity levels and sedentary lifestyle in pregnant women. In this study, no significant and strong relationship was found between psychosocial conditions and physical activity levels in pregnant women with LPP, but they pointed out that these factors may pose a risk of low physical activity. It is thought that risk factors including pregnancy-related complications, especially in the last trimester, are more effective on the decrease in physical activity [57].

Psychological distress is a common condition among women during pregnancy. Studies have demonstrated its impact on pregnancy-related LPP [55,58]. However, there is limited research on the relationship between distress and physical activity. A study by Susukida et al. (2020) revealed a relationship between mild physical activity and distress [59]. Contrarily, our study found no relationship between distress levels and physical activity levels in pregnant women. Aksoy Derya et al. reveal that online training for pregnant women during the Covid-19 period has a positive effect on the distress and anxiety levels of pregnant women [60]. We hypothesized that many pregnant women participating in the study might have high levels of distress, especially those experiencing first-time pregnancy. However, it is thought that easy access to information about the pregnancy process and regular doctor follow-ups may have contributed to lower levels of distress than expected.

In pregnant women with LPP, a high level of catastrophizing, particularly in the late stages of pregnancy, influences pain severity [6]. A study by Olsson et al. revealed that catastrophizing affected postpartum physical activity and LPP but provided no information about the pregnancy process [20]. In a study involving individuals with chronic low back pain, catastrophizing was found to affect pain and fear but had no relationship with physical activity [61]. Consistent with these findings, our study concluded that there was no relationship between catastrophizing and physical activity levels in pregnant women with LPP. For higher evidence results, studies investigating the mechanism of action of catastrophization in detail are needed.

LPP creates difficulties for pregnant women, hindering the performance of almost all daily activities [9]. For this reason, pregnant women look for solutions to cope with pain. One of the concepts discussed in pain management is pain self-efficacy. It has been reported that individuals with high levels of pain self-efficacy tend to experience lower pain intensity and disability [62]. A study of patients with knee or hip osteoarthritis showed that high levels of pain self-efficacy had a positive impact on physical activity levels and pain intensity [57]. Low self-efficacy negatively affects chronic pain management and causes catastrophization. Although a relationship has been shown between postpartum lumbopelvic pain management and pain self-efficacy, no study has been found examining the effects of pain-self-efficacy during pregnancy [63]. Contrary to studies conducted on different groups, this study did not find any relationship between pain self-efficacy level and physical activity levels [64,65]. It is thought that the contradictory results with the findings in the literature may be related to different motivations for physical activity during pregnancy and the postpartum period [66], perception of pregnancy-related pain as a temporary condition, and limited awareness among pregnant women [67].

The strength of this study lies in the analysis of multiple psychosocial factors that have rarely been investigated in the context of pregnancy. Maintaining physical activity levels during pregnancy is recommended by many committees, including WHO. With this study, we aimed to offer a different perspective for the policies and planning to be developed. However, a limitation of this study is that it did not evaluate the effects of the COVID-19 pandemic on psychosocial factors, given the conditions under which the research was conducted.

Conclusions

In conclusion, we determined that no significant relationship was found between psychosocial factors that have been shown to have an impact on pain perception in pregnant women with LPP and their physical activity levels. This shows that psychosocial factors alone are not a strong obstacle to the physical activity levels of pregnant women with LPP, and other factors should also be questioned. Additionally, our study draws attention to the psychosocial perspective for future studies and emphasizes the need for further research on this subject.

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Conflicts of interest

The authors declare no conflict of interest.

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