



Understanding physical activity behavior and cognitions in pregnant women: An application of self-determination theory

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ABSTRACT

Objectives: Although regular exercise during pregnancy is linked with improved health outcomes for both mother and foetus, many pregnant women are inactive. The purpose of this study was to use organismic integration theory (OIT) as the guiding theory for examining the relationship between autonomous and controlled motives for (a) exercise behavior reported over a typical week and barriers to exercise and (b) exercise and stage of pregnancy (i.e., trimester).

Design: Cross-sectional.

Methods: Participants (N = 75) were pregnant women who completed a multi-component, Internet-based survey.

Results: Multiple regression analyses showed that identified regulation predicted greater exercise behavior and fewer exercise barriers, irrespective of trimester. Further analyses indicated that women in the first trimester reported significantly higher identified regulation compared to women in either second or third trimesters.

Conclusions: Overall, these findings reinforce the importance of distinguishing controlled from autonomous exercise motives and demonstrate the tenability of OIT for enhancing our understanding of exercise behavior and barriers during pregnancy.

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Numerous studies have demonstrated that the benefits associated with regular exercise in the general population are far-reaching and apparent in terms of biological health and psychological well-being (Ehrman, Gordon, Visich, & Keteyian, 2008). Supplemental lines of research have further demonstrated that exercise is as important for pregnant women as it is for their non-pregnant counterparts (American College of Sports Medicine, 2006). Exercise of a suitable intensity and duration can help manage pregnancy-related musculoskeletal issues, positively impact mental health, reduce the need for obstetric intervention as well as reduce the risk of insidious maternal-foetal conditions such as gestational diabetes and pre-eclampsia (American College of Sports Medicine, 2006; Zavorsky & Longo, 2011). On the basis of this compelling evidence, both Canadian and American guidelines recommend that all pregnant women without contraindications should accumulate a minimum of 30 min of moderate-intensity aerobic

exercise at least 4–5 times per week (Davies, Wolfe, Mottola, & MacKinnon, 2003; Zavorsky & Longo, 2011).

Despite the strength of the evidence-base informing the recommendation to initiate or remain engaged in exercise behavior during pregnancy, epidemiological studies have demonstrated that pregnant women are less active than non-pregnant women and that only 11–15% of pregnant American women (Evenson, Savitz, & Huston, 2004; Petersen, Leet, & Brownson, 2005) and 23% of Canadian pregnant women (Gaston & Vamos, 2012) engage in recommended levels of exercise. One construct that may be useful in terms of understanding the factors that contribute to exercise behavior during pregnancy is motivation.

Theoretical framework

To the best of our knowledge, only a handful of theoretical models have been applied to the study of exercise among pregnant women. These theoretical models include the theory of planned behavior (TPB; Hausenblas & Symons Downs, 2004; Hausenblas, Symons Downs, Giacobbi, Tuccito, & Cook, 2008; Symons Downs & Hausenblas, 2003, 2004, 2007), protection motivation theory (Gaston & Prapavessis, 2009), and social

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cognitive theory (Cramp & Bray, 2009) with partial support noted for each theory's psycho-social variables in relation to understanding exercise behavior. With respect to research using the theory of planned behavior, for example, support was found for all of the theory's variables (i.e., attitudes, social norms, and perceived behavioral control), and four out of five studies found that intention was a significant predictor of exercise behavior, explaining between 16 and 47% of the variance in exercise behavior (Hausenblas et al., 2008; Symons Downs & Hausenblas, 2003, 2004, 2007). Using protection motivation theory, Gaston and Prapavessis (2009) reported that three of the theory's four main constructs (perceived severity, response efficacy, and self-efficacy) accounted for 51% of goal intention, whereas self-efficacy and implementation intention emerged as the only predictors of actual behavior ($R^2 = .16$). Finally, in a prospective examination of pregnant women's exercise behavior using social cognitive theory, Cramp and Bray found that whereas exercise self-efficacy was the best predictor of exercise from weeks 18–24 ($R^2 = .26$) to 30–36 ($R^2 = .37$), barrier self-efficacy predicted exercise from weeks 24–30 ($R^2 = .32$).

Although there is no doubt that this body of work represents a significant contribution toward our understanding of exercise during pregnancy, the theoretical models used in previous research assess motivation indirectly through related constructs such as intention. In contrast, organismic integration theory (OIT; Deci & Ryan, 2002), a subcomponent of self-determination theory (SDT; Deci & Ryan, 2002), provides a direct and more detailed account of diverse reasons (or motives) that regulate participatory behaviors (such as exercise) and adaptive human functioning. Central to OIT is the idea that the type, or quality, of an individual's motivation is as important as the overall amount of motivation that individual possesses. Using a diverse array of samples, researchers have demonstrated that behavioral regulations conceptualized in a manner forwarded within OIT captures variance in exercise behavior not accounted for by constructs pivotal to other social cognitive theories (Hagger & Chatzisarantis, 2009; Pinto & Ciccolo, 2011). Given the complexity inherent within pregnant women's exercise patterns and the challenges associated with initiating or sustaining exercise during pregnancy (Gaston & Cramp, 2011), OIT may represent a useful theory for advancing our understanding of exercise within this cohort.

Proponents of OIT (e.g., Deci & Ryan, 2002) posit that the reasons people endorse for regulating their behavior lie on a continuum that represents varied degrees of internalization and integration with the self (or 'self-determination' in OIT parlance; Deci & Ryan, 2002). Anchoring one end of the motivational continuum is amotivation, a state akin to learned helplessness whereby a person cannot perceive any reason why they would (or should) engage in the target behavior (Deci & Ryan, 2002). A person who is experiencing amotivation toward exercise lacks genuine intention to sustain their involvement and greater levels of amotivation have been linked with lower levels of perceived effort to participate in regular exercise accompanied by a lack of importance ascribed to this behavior (Wilson, Rodgers, Fraser, & Murray, 2004).

In contrast to amotivation, two broad classes of motivation theorized to underpin health behaviors such as exercise participation are forwarded within OIT (Deci & Ryan, 2002). Controlled motives regulated behavior via the use of imposing sanctions or external incentives and represent the least self-determined form of extrinsic motivation noted within OIT (Deci & Ryan, 2002). Two conceptually distinct forms of controlled motivation have been posited within OIT, namely external and introjected regulations (Deci & Ryan, 2002). External regulation is the most controlling form of extrinsic motivation that promotes behavioral compliance

based on a desire to please others or comply with an externally imposed sanction (Deci & Ryan, 2002). People who are motivated by introjected regulation, on the other hand, are compelled to act by self-imposed contingencies that bolster a fragile sense of self-worth or to avoid negative emotions associated with disengagement (e.g., guilt). Although controlling motives can promote exercise behavior (e.g., Wilson et al., 2004), the focus on satisfying external demands imposed by others or appeasing contingent demands often can produce diminished well-being that likely will not sustain behavior (Deci & Ryan, 2002).

Behavior underpinned by autonomous, as opposed to controlling motives, is regulated by personally valued interests or the inherent satisfaction of the activity itself (Deci & Ryan, 2002). OIT includes two autonomous forms of extrinsic motivation, namely identified and integrated regulations. Identified regulation represents the 'lower boundary' of autonomous functioning, given that this source of extrinsic motivation sustains behavior because the activity is recognized as personally important by the individual due to the valued outcomes ascribed to participation (Deci & Ryan, 2002). Integrated regulation represents the 'upper boundary' of autonomous yet extrinsic motivation. People are motivated by integrated regulation when the instrumental nature of the target behavior (e.g., exercise) is coherently aligned with other value structures operating within different life domains (e.g., education and work). In contrast, intrinsic regulation is the most autonomous form of motivation specified within OIT (Deci & Ryan, 2002). Intrinsic regulation concerns "doing an activity for its own sake" (Ryan & Deci, 2007, p. 2) and is accompanied by feelings of fun, self-interest, personal accomplishment, or the self-rewarding nature of the behavior itself (Deci & Ryan, 2002). Previous research using samples of young adults engaged in exercise behavior indicates that identified and intrinsic regulations positively correlate with more frequent exercise participation (Wilson et al., 2004), greater intentions to be physically active (Wilson & Rodgers, 2004), more functional commitment to exercising regularly (Edmunds, Ntoumanis, & Duda, 2007), and distinguish females with higher (as opposed to lower) perceptions of their physical self-concept, a common indicator of emotional adjustment and well-being (Wilson & Rodgers, 2002).

The utility of distinguishing controlled from autonomous forms of motivation for a number of health-promoting behaviors has been forthcoming (Deci & Ryan, 2002) but remains to be tested in pregnant women to determine the pragmatic benefits of OIT for understanding exercise in this cohort. Because pregnant women face a number of diverse and potentially unique challenges to initiating and/or sustaining exercise (Cramp & Bray, 2009; Evenson, Moos, Carrier, & Siega-Riz, 2009), it is likely that they require more autonomous types of motives to regulate and sustain their engagement. Indeed, previous research indicates that pregnant women's levels of exercise decrease across the duration of pregnancy (Gaston & Cramp, 2011), and that this reduction is actually paralleled by dramatic shifts in the reasons women endorse for participating in exercise. For example, Duncombe and colleagues found that whereas 54% of women reported exercising for 'enjoyment' at Time 1, only 39% reported this same motive 16 weeks later (Duncombe, Wertheim, Skouteris, Paxton, & Kelly, 2007). With respect to reasons for not exercising, the proportion of women reporting that exercise was 'too uncomfortable' increased from 5% to 18% across the same temporal period. Collectively, the results noted by Duncombe et al. indicate that motives aligned with more autonomous reasons for exercise may decrease at latter stages of pregnancy.

In sum, the bulk of the literature concerning the motivation–exercise behavior relationship has focused on testing the ideas set forth by Deci and Ryan (2002) within the framework of OIT in

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