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Running head: MOTIVATION BEFORE AN EXERCISE REFERRAL SCHEME

In the Beginning: Role of Motivation and Autonomy Support By Significant Others on Mental Health and Physical Activity Intentions in Participants Entering an Exercise Referral Scheme

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Abstract

Self-determination theory highlights the importance autonomy supportive environments can have on positive health outcomes, yet little is known about whether differential effects occur as a function of who provides this support. Further, there is no research on the role of motivation and the social environment for mental health and intentions to be physically active before entering an exercise referral scheme. This study samples 347 British adults about to start an exercise referral scheme. Regression analyses revealed that the effects of autonomy support on mental health and physical activity intentions differed as a function of who provided the support (offspring, partner, physician), with offspring having the weakest effects. A structural equation model has shown that autonomy support and more autonomous regulations lead to more positive mental health outcomes and stronger intentions to be physically active. Knowledge of the motivation of those about to commence an exercise program can provide important insights for professionals supporting such efforts.

Keywords: Self-determination theory, motivational regulations, exercise behaviour change.

In the Beginning: Role of Motivation and Autonomy Support By Significant Others on Mental Health and Physical Activity Intentions in Participants Entering an Exercise Referral Scheme

Despite overwhelming evidence supporting the benefits associated with physical activity (Blair, 2009; Blair & Morris, 2009), people show remarkable resistance to adopting and maintaining this positive health related behaviour (Williams et al., 2002). Research grounded in self-determination theory (SDT; Deci & Ryan, 1985) has highlighted the positive influence that environmental support can have on helping health behaviour change as well as associated physical and psychological health benefits (Williams, Gagne, Ryan, & Deci, 2002). Research to date has focussed on the contribution that exercise instructors make to the environment when participants are already engaged in physical activity, while research based in a healthcare setting has highlighted the role of the physician in providing environmental support. However, individuals are influenced by a variety of significant others and each may make a unique contribution towards the environment when participants are about to attempt behaviour change. In sum, little is known about the contribution made by different significant others to the environment and its influence on the motivation and well-being of individuals in the beginning- when they are about to commence a physical activity programme. The aim of the present study is to redress these gaps in the literature.

Self-determination Theory

Self-determination theory (Deci & Ryan, 2000) is concerned with "why" we engage in specific behaviours and focuses on the degree to which people's motivation toward engagement in activities, such as physical activity, are more or less self-determined or controlled by external

or internal pressures. SDT proposes that when an activity is not intrinsically motivating (i.e., participation in an inherently enjoyable activity), a taxonomy of extrinsic regulations exist which are assumed to lie on a continuum and each regulation differs by the degree in which they represent autonomy of action (Ryan & Deci, 2002). Extrinsic regulations are least autonomous and indicate a behaviour that is conducted for tangible reward (e.g., money or praise). As we progress along the continuum, introjected regulations form and represent the motive to perform a behaviour to avoid guilt and shame, or attain feelings of self worth. Finally, identified regulation encourages engagement due to an understanding and acceptance of the benefits associated with participating in the behaviour. Although these regulations are assumed to exist on the relative autonomy index, Deci and Ryan (2000) indicate that these regulations cluster to form autonomous versus controlled regulations. Intrinsic and identified regulations combine and are considered autonomous while introjected and external regulations are controlling (Deci & Ryan, 2000). SDT further proposes an amotivated state in which an individual lacks any intention or desire to conduct the behaviour. Previous research has shown that more autonomous motives correspond to positive outcomes, such as, better performance (Black & Deci, 2000), improved persistence (Pelletier, Fortier, Vallerand, & Briere, 2001) and enhanced well being (Niemiec et al., 2006). Therefore, environments that support the development of autonomous regulations are considered important for optimal physical and psychological health.

Autonomy Support

Research investigating effective environmental support has been considered in terms of social support (Carron, Hausenblas, & Mack, 1996), but from an SDT standpoint autonomy support is the critical environmental feature. Autonomy support is a clearly defined construct consisting of a behaviour set that an individual may conduct that influences the environment of

another and facilitates the formation of self-determined regulations. For example, a health fitness advisor that creates an autonomy supportive environment offers their client's the opportunity for choice over the activity (Williams, Cox, Kouides, & Deci, 1999; Pelletier et al., 2001), acknowledges positive and negative feelings towards becoming physically active in an empathetic manner (Reeve, Jang, Hardre, & Omura, 2002; Edmunds, Duda J, & Ntoumanis N, 2007), understands the clients' perspective (Pelletier et al., 2001; Reeve & Jang, 2006) and encourages ownership and self initiative towards becoming physically active (Williams et al., 2006; Reeve, 2002; Deci & Ryan, 1987). SDT and previous research highlights that when an autonomy supportive environment is created our reasons for conducting a behaviour become more self determined or autonomous.

Health behaviour change settings have been the focus of previous research investigating autonomy supportive environments. Williams and colleagues studied the impact of autonomy support on a series of health behaviours (smoking, weight control, medication adherence and glycemic control) and revealed that perceptions of autonomy support positively predicted autonomous reasons for conducting the specified health-related behaviour. For example, physicians were trained to create an autonomy supportive environment during one to one consultations with participants attempting to quit smoking (Williams et al., 2006). Results revealed that an autonomy supportive environment predicted more autonomous reasons to quit smoking compared to a controlling environment. Therefore, it appears that an autonomy supportive environment has a positive relationship with self-determined motivation.

A major purpose of this study, in terms of participants about to commence a physical activity programme, is to investigate the role of autonomy support on their reasons for becoming physically active over the approaching twelve week programme. While previous research has

focussed on a pre-identified and selected significant other, it is our belief and an aim of this study, to investigate whether a variety of significant others such as partners, family members and friends make important and unique contributions to the environment and an individuals' motivation for becoming physically active.

Behavioural Intentions and Affective Outcomes

Self-determined motivations are important for health behaviour change because SDT emphasises their positive association with beneficial outcomes such as persistence, intentions and optimal functioning. In contrast when an individual is amotivated or possesses controlled regulations, negative outcomes are thought to ensue. Autonomy support and autonomous reasons to participate in physically active behaviours are important for facilitating the adoption of these outcomes. For example, in a sample of exercise referral participants, Edmunds, Ntoumanis and Duda (2007) identified intrinsic motivation as a positive predictor of general positive affect while introjection, a controlling regulation, as a negative predictor of subjective vitality. Further to the associated affective outcomes, autonomous regulations have shown a positive relationship with behavioural intentions. Wilson and Rodgers (2004) showed that the exercise regulations of an intramural sport sample accounted for 49% of the variance in behavioural intentions to exercise. Furthermore, autonomous regulations demonstrated the strongest positive associated with these exercise intentions. In contrast, controlling forms of social influence have been negatively linked to intentions (Chatzisarantis, Hagger, & Smith, 2007).

Autonomy support has also been shown to facilitate positive attitudes and behavioural intentions and consistently correlates with physical activity intentions in research conducted in the physical domain (Chatzisarantis et al., 2007; Chatzisarantis, Hagger, & Brickell, 2008; Lim & Wang, 2009). In two studies examining the influence of perceived autonomy support on

physical activity intentions, Chatzisarantis et al.(2007) revealed support for the existence of a positive relationship between these two constructs in both school children and university students. This finding is also supported in a physical education setting, where Lim and Wang (2009) highlighted that external regulations were negatively associated with physical activity intentions while autonomous regulations were positively linked with these intentions.

Study Aims

No SDT-grounded research, that we are aware of, has investigated the differential predictive utility of perceived autonomy support on well being and physical activity intentions as a function of who is providing the support. Therefore, research has failed to identify whether a differential effect on positive or negative outcomes occurs as a function of who is providing this support. Our study of participants about to enter an exercise referral scheme aims to investigate whether differential effects on mental health and physical activity intentions occur as a function of who provides autonomy support. The second aim of this study is to understand the relationship between autonomy support provided by significant others, motivational regulations and affective outcomes before one "walks through the door" to commence a physical activity programme.

Method

Participants

Participants (*n*= 347) were individuals about to participate in an exercise referral scheme in a West Midland city in the UK. Entrance onto the exercise referral scheme was based on being identified by a physician or practice nurse at a primary care level as a) carrying at least two risk factors of cardiovascular disease (e.g., being overweight, smoking), b) currently not participating in regular physical activity and c) perceived to have the motivation to increase his/her physical

activity levels. All participants were part of a larger study investigating the effectiveness of the exercise referral scheme.

Measures

Significant other autonomy support.

Autonomy support was assessed through an adapted version of the Health Care Climate Questionnaire (HCCQ; Williams, Virgina, Zachary, Deci & Ryan, 1996). Participants were asked an open ended question that aimed to identify one significant other that was particularly influential in their attempt to become physically active "Who is the most important person in your effort to becoming healthier through physical activity?". The perceived level of autonomy support provided by the identified significant other was assessed using six adapted items from the HCCQ (e.g. "I feel that my important other understands how I see things with respect to my physical activity"). Each item was responded to using a 7-point Likert-type scale (*strongly disagree* = 1; *strongly agree* = 7). Previous research in an exercise setting has demonstrated good internal reliability using adapted items from the HCCQ (Adie, Duda, & Ntoumanis, 2008).

Reasons to exercise.

Participants' motivation for engaging in exercise was measured using the Behavioural Regulation in Exercise Questionnaire-2 (BREQ-2; Markland & Tobin, 2004). The BREQ-2 measures four different exercise regulations (i.e. intrinsic, integrated, introjected and external), as well as amotivation. All the BREQ-2 subscales have been shown to have good internal consistency in previous research conducted in an exercise referral scheme (α= .70 - .91; Edmunds, Ntoumanis, & Duda, 2007). Each subscale was measured with four items except the introjected subscale which comprised of three items. An example item for Intrinsic regulations is, "I engage in physical activity because it is fun"; Integrated "I value the benefits of physical

activity"; Introjected "I feel very guilty when I don't exercise"; Extrinsic "I regularly engage in physical activity because other people say that I should" and Amotivation "I don't see the point in being physically active"**.** All items were rated on a scale anchored by 0 "*Not at all true*" and 4 "*Very true*".

Subjective vitality.

The six item version of the Subjective Vitality Scale (SVS; Ryan & Frederick, 1997; Bostic, Rubio, & Hood, 2000) was used as a measure of good mental health. Participants responded to how, over the last two weeks they felt using a scale anchored by 1 "*Not at all true*" to 7 "*Very true*". The SVS has shown to have good internal consistency with Cronchbach alphas ranging from 0.84 - 0.86 (Bostic, Rubio, & Hood, 2000), including past work in the exercise context specifically.

Depressive symptoms.

Depressive symptoms were assessed with the 7-item subscale from the Hospital Anxiety and Depression Scale (HADS; Zigmond & Snaith, 1983). The items are scored on a four-point scale ranging from 0 "*Not Present*" to 3 "*Considerable*". A recent review highlighted that most studies using the HADS have used samples with cancer or other somatic illnesses (Bjelland, Dahl, Haug, & Neckelmann, 2002). Although less research has utilized the HADS with the general public, across these samples Cronbach's alpha for the HADS-D varied from .67 to .90 (Bjelland et al., 2002).

Physical activity intentions.

Participants' intentions to engage in regular physical activity (at least 5 days a week for a total of 30 minutes each day during the next three months) were assessed with three items; "I intend to regularly engage in physical activity during the next 3 months", "I expect to regularly

engage in physical activity during the next 3 months" and "I plan to regularly engage in physical activity during the next 3 months". These items were rated on a scale ranging from 1 "*strongly agree*" to 7 "*strongly disagree*".

Procedure

Ethical approval to conduct the study was obtained from the local university ethics review committee. Participants were sent via post a multi-section questionnaire containing the instruments described above, and were asked to complete each section before arriving for their first consultation on the exercise referral scheme. Instructions informed the participants that there were no right or wrong answers and asked to respond truthfully. The questionnaire batch took approximately 20-25 minutes to complete.

Results

Table 1 (descriptive statistics, bivariate correlations and internal reliability coefficients) reveals that participants perceived their significant others to be providing a high level of autonomy support (5.28). Further our participants BREQ-2 scores indicate that autonomous regulations (2.5) were predominant in our sample and amotivation scores were low (.35). Mean scores for vitality (3.62) were higher than depressive symptoms scores (.85) while scores for physical activity intentions were also high (5.02). Bivariate correlations between the latent variables supported the predicted model. Perceived autonomy support was significantly and positively associated with autonomous motivation (.244), and negatively with amotivation (-.202). Autonomous motivation was significantly and positively associated with vitality (.343) and physical activity intentions (.205). All alpha coefficients ranged from .70 to .94, indicating the internal consistency of each measure was stable.

Regression Analyses

A series of hierarchical regression analyses were conducted to explore the independent and interactive effects of perceived autonomy support as a function of who provides that support on three dependent variables: physical activity intentions, vitality and depression. Partner (*n*=126) was most frequently identified as the significant other important in participants' planned attempt to become healthier through physical activity. Offspring (*n*=47) and physician/nurse (*n*=43) were subsequent and all three combined represented 74% of the significant others identified. Therefore, data from two hundred and sixteen participants (M age 50.12 ± 13.4 years) were included in the regression analyses.

Autonomy support provided by a significant other was entered into our regression model as a categorical predictor variable. Dummy coding is the most frequently utilized procedure for representing categorical variables investigating interactions between categorical and continuous variables (Aiken & West, 1991). The three most commonly cited significant others (partner, physician/nurse and offspring) were included in the analysis. Two dummy variables were created. Partner was selected as the comparison group because this significant other represented the most frequently selected category (Field, 2005) and was coded as zero in both dummy variables. Dummy variable 1 identified autonomy support provided by physician/nurse which was coded as 1 (offspring=0). In the second dummy variable, offspring was coded as 1 (physician/nurse=0). Following the recommendations by Aiken and West (1991), autonomy support scores were standardised before analyses were conducted. In step 1 of each regression, the standardised scores for autonomy support by a significant other were entered with Dummy Variable 1 (Physician/Nurse) and Dummy Variable 2 (Offspring). Two further dummy variables were created to represent the interactions. In step 2 of each regression, the interaction terms between each dummy variable and autonomy support variables were added.

With respect to physical activity intentions, step 1 was significant [F (3, 203) = 9.56; p<.001], and autonomy support provided by significant others accounted for 12.4% of the variance in participants' intentions (R^2= .12). In Step 2, the interaction between dummy two and autonomy support was also significant (β=-.67; p<.05). For depressive symptoms, step 1 was significant [F (3, 204) = 3.79; p<.001] and autonomy support provided by significant others accounted for 5.3% of the variance in participants' depressive symptoms (R^2= .053). In Step 2, the interaction between dummy one and autonomy support was significant (β=.22; p<.05). For vitality, step 1 was not significant [F (3, 204) = 2.22; p>.05].

Post hoc probing.

The significant interactions between the categorical and continuous variables, in two of the three dependent variables, reveals that the effect of autonomy support varied as a function of who provided it, but does not identify where these differences lie (Aiken & West, 1991). Post-hoc probing of the significant interactions was conducted to examine whether the slope of the simple regression line differed significantly from zero. To probe the significant interactions, the standard errors of the simple slopes of the regression equations were calculated and t-tests for the significance of the simple slopes were computed (Aiken & West, 1991).

Interactions between autonomy support and a categorical variable (the significant other that provided the support) were explored and Figures 1a-c show the emerging interaction plots. Regression analysis revealed that autonomy support provided by partners (b =.75) and physicians (b= .87) significantly predicted physical activity intentions. In contrast, autonomy support provided by offspring (b=.07; p>.05) did not significantly predict these intentions. Further, autonomy support provided by partners significantly and inversely predicted depressive

symptoms (b= -.16); autonomy support provided by physicians or offspring did not predict depressive symptoms.

Structural Equation Modelling

Due to the lack of a predictive effect from offspring in the regression analyses, only data collected from participants who identified a partner or physician/nurse as providers of autonomy support are included in our structural equation model. Structural equation modelling (SEM) was conducted to test whether our hypothesised model was consistent with our data.

The robust maximum likelihood estimation method of analysis was implemented which provides a correction for non-normality in large samples (Byrne, 2006). Model fit was evaluated using the Satorra-Bentler chi-square statistic, the Standardised Root Mean Square Residual (SRMR; an absolute misfit index, values decrease as goodness of fit improve), and Root Mean Square Error of Approximation (RMSEA) A hypothesised model is thought to show a good fit to the data if the CFI is equal to or above .95, and the SRMR and RMSEA are equal to or less than .08 and .06, respectively (Hu & Bentler, 1999). Consistent with previous research, the number of observed variables was reduced by forming parcels (Reinboth, Duda, & Ntoumanis, 2004; Sebire, Standage, & Vansteenkiste, 2009). Parcels were created using factor loadings as a guide. The largest factor loading was paired with the lowest to provide balance between the parcelled indicators (Little, Cunningham, Shahar, & Widaman, 2002). Three parcels were created for perceived autonomy support, physical activity intentions and depressive symptoms. Four parcels were created for each of the motivation regulations. In-line with Deci and Ryan's (2000) theoretical writings, an autonomous latent variable was created by combining intrinsic motivation and identified items in the parcels and a controlled motivation latent variable by

combining external regulations and introjected items in the parcels. Amotivation was represented by four observed variables while five items were used as indicators of vitality.

Our hypothesised model was tested and revealed an inadequate fit to the data CFI= .90; NNFI=.90, RMSEA= .07 (90% CI= .05-.08), SRMR=.11. We proceeded in a model generating fashion to modify and re-estimate the relationships. In model assessment, misspecifications in our hypothesized model were investigated through the Wald and Lagrange Multiplier (LM) tests. Inspection of the modification indices revealed that co-varying autonomous regulations and controlled regulations and amotivation, and co-varying vitality with depressive symptoms would improve the model fit. These modifications are supported by theory highlighting that the motivational regulations are assumed to exist on a continuum that intercorrelate (Ryan & Connell, 1989). The modification indices suggested improvement would also be made by freeing model parameters. Non-significant relationships between latent variables were removed and a direct relationship between perceived autonomy support and physical activity intentions was added. All identified changes were considered in theoretical terms and with respect to previous empirical evidence before being implemented. For example, previous research has shown a direct link between perceived autonomy support and physical activity intentions (Chatzisarantis et al., 2007).

Our final model indicated a good fit to the data: CFI= .94; NNFI=.93, RMSEA= .06 (90% CI= .04-.06), SRMR=.085 (see Figure 4). This model indicates that higher levels of autonomy support provided by one's significant other positively predicted autonomous regulations and inversely predicted amotivation. In turn, higher levels of autonomous regulations predicted increased levels of vitality. Autonomy support provided by a significant other also revealed a direct positive relationship with physical activity intentions. Controlled reasons for

participating in physical activity were positively associated with characteristics of negative mental health through depressive symptoms.

Discussion

This explorative research highlights that the relationship between autonomy support and the mental health and physical activity intentions of our participants varied according to whom provided that support. Our structural model revealed that autonomy support provided by partners and physician/nurses were associated with more autonomous reasons for becoming physically active. Further, these autonomous motivations were associated with positive mental health outcomes, in the beginning, when individuals were about to commence an exercise referral scheme.

Autonomy Support Provider Matters

Previous research (Chatzisarantis et al., 2008) has requested participants rate perceived autonomy support provided by significant others (e.g. friends, family members and parents) without differentiating between particular agents of support. In contrast, the present research asked participants to specify a single most influential significant other, important in their attempt to become physically active and rate their perceived level of autonomy support. Our results indicate that it may be important to specify the significant other providing autonomy support as the relationships between perceived autonomy support, mental health and physical activity intentions varied as a function of who provided it.

Physical activity intentions.

Our analyses indicated that perceived autonomy support contributed to the prediction of physical activity intentions. This result is consistent with previous studies in high school children, university students and young adults in which a positive relationship has also been

found between perceived autonomy support and physical activity intentions (Chatzisarantis et al., 2007; Chatzisarantis et al., 2008). The current research extended this work in an older population and also reveals that the significant other providing an autonomy supportive environment influences the strength of this relationship. Our results have shown that perceived autonomy support provided by partners and physician/nurse contributes to the prediction of physical activity intentions, but this was not the case for offspring autonomy support. Offspring's differential pattern of association with physical activity intentions may be explained by the lack of opportunities available for them to make meaningful contributions to their parents attempt to be come physically active. Sixty-five percent of our sample was aged between 40-65 years indicating that the majority of offspring are approximately 10-25 years old. At this stage of their offspring lives the amount of time and opportunities to support their parent's attempts to be physically active may be minimal. Further explanation may lie in the balance between the importance placed on the interpersonal relationship and the actual expertise that offspring possess in order to provide effective autonomy support.

Depressive symptoms.

Perceptions of autonomy support provided by partners predicted depressive symptoms negatively in contrast to physician/nurse and offspring whose autonomy support did not predict these symptoms significantly. The relationship between partner autonomy support and depressive symptoms may be dependent upon the type and quality of relationship that exists between the partners. Proulx et al. (2007) highlights that relationship discord predicts the onset of major depression, and that this relationship is particularly pertinent in women, the predominant gender in this sample. This explanation is further supported by Gaine and La Gaurdia (2009) who assessed the contributions of motivation to relationship well-being and

found that when people are more willing to engage in various tasks of their relationship greater levels of vitality are shown. In contrast, the more pressured or coerced they feel in their relationship the more poorly the relationship functions. Even so, this finding contradicts that found by Williams et al. (2005), who highlighted that autonomy support provided by US physicians was linked to reported depressive symptoms among their patients. The frequency that the two samples saw the same physician may provide an explanation for this contradiction. Participants in Williams et al's study consistently visited the same physician, in contrast, participants in the present study may have visited a series of different physicians therefore reducing the opportunity for them to build rapport and effectively impact affective outcomes such as depressive symptoms. Further research is necessary to help elucidate whether cultural differences or patterns of visits to the physicians explains this contradiction.

Vitality.

Perceived autonomy support did not significantly contribute to the prediction of vitality. This finding does not support previous research revealing that even autonomy support provided by an experimenter leads to enhanced feelings of vitality (Muraven, Gagne, & Rosman, 2008). This surprising result may indicate that other constructs such as autonomous motivation are the significant contributors to the prediction of vitality. An explanation we return to shortly.

Future Directions

For two of the interpreted outcomes, the results indicate that the effects of autonomy support differed as a function of who provides it. As we have found differences in mental health outcomes as a function of who provides autonomy support, each significant other may make a unique contribution to an overall autonomy supportive environment. Therefore, it is important that future studies identify all "significant others" when tapping such an environment. To clarify

this further, future research could request each participant to rate their perception of autonomy support for a range of significant others to allow normative comparisons.

An explanation of the mechanism behind this differential effect may lie in which basic psychological needs (Ryan & Deci, 2000) are being satisfied via the provision of autonomy support. Satisfaction of the basic psychological needs for competence, autonomy and relatedness may fluctuate as a function of who is identified as important in their attempt to become physically active. Research has shown that autonomy support leads to the satisfaction of all three basic needs, but the level to which each need is satisfied may vary. For example, in the context of sport, Adie et al. (2008) found that autonomy support provided by a coach led to the satisfaction of all three needs. However, relatedness demonstrated the largest path coefficient followed by autonomy and then competence. Satisfaction of the basic psychological needs via physical activity was not assessed at baseline in the present study due to the fact that the participants had not started the exercise programme. Future research that assesses the satisfaction of basic psychological needs as a function of who provides the support would clarify their role and make an interesting contribution to the literature.

Testing a Process Model

Our model indicates that environmental support and reasons for participating in physical activity have an impact on participant well-being and physical activity intentions in the beginning before entering an exercise referral scheme. Perceived autonomy support positively predicted autonomous reasons for participating in physically active behaviours. Predominantly middle aged adults, about to enter a physical activity intervention, showed more self-determined reasons for participating in physical activity when they perceived their significant others to be creating an environment that is autonomy supportive. This observed relationship may be due to

greater functional significance being placed on the behaviour (i.e., identified regulations; valuing the expected outcomes), or participating in the behaviours for the enjoyment (i.e. intrinsic reasons). This finding provides further support to literature showing a positive relationship between autonomy support and autonomous regulations for participating in physical activity (Wilson & Rodgers, 2004).

As predicted, autonomy support was negatively linked to being amotivated towards becoming physically active. Amotivation indicates that an individual has a lack of autonomous or controlled reasons to participate in any given behaviour (Deci & Ryan, 2000). This observed negative relationship indicates that when choice is provided, perspective of opinion is taken and there is an acknowledgment of positive and negative feelings towards the targeted behaviour by significant others, amotivation is an unlikely outcome. Previous research has shown the same relationship to amotivation when autonomy support is provided by coaches (Pelletier et al., 2001) and physical education teachers (Lim & Wang, 2009; Standage, Duda, & Ntoumanis, 2003).

We further predicted that autonomy support would predict negatively controlling behaviours. However, in the final model, no significant path was found. An explanation for this non-finding may be that in the past, controlling regulations had been thought to manifest as a consequence of low autonomy support. It is possible however, that an actively need thwarting environment is necessary to form these types of regulations. That is, the absence of a significant path between autonomy support and controlling behaviours provides further corroborative evidence that it requires more than the absence of perceived autonomy support to create controlled regulations. Further, in research that has studied the relationship between autonomy support and controlled regulations, the path coefficients are far lower than those observed for

autonomous regulations. For example, among young women, Wilson and Rogers (2004) reported a model path coefficients between autonomy support provided by friends and intrinsic regulation and identified regulation of .56 to .58 respectively, compared to two non-significant path coefficients for external and introjected regulations which were -.10 and .09 respectively.

Outcomes of autonomy support and motivation regulations.

After explorative analysis the model of best fit revealed that none of the regulations were associated with physical activity intentions. Instead the re-specified model, revealed a direct link between autonomy support and physical activity intentions. Previous research (Chatzisarantis et al., 2007) has indicated that autonomy support contributes to intentions regarding subsequent physical activity engagement. Our structural model indicates that this path is not indirect via motivational regulations, as had been predicted, in participants who are about to enter a physical activity intervention. Therefore, when our participants perceived their environment to be autonomy supportive it was more likely that they possessed better intentions to be physically active over the forthcoming exercise programme. Previous research that has incorporated perceived autonomy support into the theory of planned behaviour (Chatzisarantis et al., 2007) has shown the same direct relationship between autonomy support and physical activity intentions (Chatzisarantis et al., 2007). Even when no direct link between autonomy support and intentions is included in SDT-based structural models a correlation appears to be evident. For example, Lim and Wang's (2009) structural model revealed no path from autonomy support (teacher) to physical activity intentions, but a significant positive correlation was reported. Autonomy support's relationship with intentions could be underpinned by its impact on the basic psychological needs. For example, when an individual is in an autonomy supportive environment your feelings of competence may be enhanced which could then influence your intentions. This

argument is supported by the self-efficacy literature indicating a positive association between self-efficacy and physical activity intentions (Tulloch et al., 2009).

Our model also revealed a positive association between autonomous regulations and vitality. This finding endorses previous research and supports the link between self determined motivation and well being. For example, through a series of studies Nix et al. (1999) concluded that engaging in self-determined activity can enhance subjective vitality relative to engaging in more controlled activity. Thus, when the reasons for participating in physical activity were more autonomous or self-determined, participants were more likely to feel a sense of energy and vitality. This finding clarifies the non-significant regression analyses reported between autonomy support and vitality by indicating that it is our motivation towards a behaviour that impacts our perceptions of vitality. These feelings of vigour may be explained by the fact that when we possess more autonomous motivation we value the behaviour and the benefits that may be gained from being physically active in the future. Therefore, participants are likely to feel invigorated by the prospect of becoming more physically active.

In contrast, when our motivation is not self determined, or is more controlled, our model indicates that depressive symptoms are more likely to ensue. This finding provides corroborative evidence for the potentially negative impact of controlled motivations on our psychological health. Further, this is supportive of research highlighting the positive relationship between controlled motivation and indicators of negative well-being (Vansteenkiste, Zhou, Lens, & Soenens, 2005). When we participate in behaviours for external reward or because somebody else has told us to (without self-endorsement) characteristics of depression such as, being unable to look forward to participate in activities and a lack of enjoyment in participation, are likely outcomes.

Practical Implication

The current research provides a unique insight into the determinants and consequences of motivation in those at the beginning of their journey to health behaviour change. The sample investigated was drawn from a population about to commence participation in an exercise referral scheme. Knowledge of these participants' environmental support and motivation offers important information for health fitness advisors regarding their clients' reasons for commencing behaviour change, furthermore, its impact on their well-being and physical activity intentions. This knowledge can aid exercise professionals in how to continue with the most effective support, in terms of achieving maintained behaviour change combined with optimal physical and psychological functioning.

Strength and Limitations

Social support has been highlighted as important for attempts to change our physical activity behaviour (Carron et al., 1996), however, our study has focussed on the autonomy supportive features of the environment. Whereas social support is a broad and vaguely defined concept, the present research highlights a series of specific behaviours that a significant other can implement in an attempt to be autonomy supportive. Future research that examines the individual and combined contribution of autonomy support and motivational regulations would be a valuable addition to the literature.

Previous research on motivation to exercise has concentrated on the environment that is created during exercise classes (Edmunds, Ntoumanis, & Duda, 2006) and school physical education lessons (Tessier, Sarrazin, & Ntoumanis, 2008). Our research makes a unique contribution to the literature by exploring the environment that exists before individuals engage in exercise. We have shown that participants arrive at the beginning of their exercise

programmes with a variety of motivations and that these motivations are already influencing their psychological health and well-being. Therefore, knowledge about their client's motivation is critical for the exercise instructors to help progress the process of behaviour change and improve their well-being.

A limiting aspect of this research is the self report nature of perceived autonomy support. Elevated scores on the HCCQ indicate that all participants rated their significant others favourably providing less variance in the data. Future study designs that can tap the support provided by significant others in a more objective manner or triangulating different methods may provide even greater understanding of the contribution that autonomy support makes towards our motivation. A second limitation lies in the cross-sectional nature of the data as it provides only a single snapshot in time. However, no previous research that we are aware of, has considered the impact of autonomy support at the beginning of an intervention. The current cross sectional data has allowed an initial insight into the effect of autonomy support and provides a basis for future research designs that attempt to predict the relationships between autonomy support, motivational regulations and indicators of well-being over time.

In sum, our findings provide important insights for Health Fitness Advisors in how best to begin and/or continue the clients' process of forming self-determined reasons for becoming physically active. In turn, this will support the identified impacts on their clients' well-being and intentions to be physically active before commencing a physical activity programme.

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Table 1

Reliability Analyses (Cronbach's coefficient α) Descriptive Statistics, and Bivariate Correlations for Perceived Autonomy Support, Motivational Regulations for Exercise, Mental Health and Physical Activity Intentions.

Variables	*α*	*M*	*SD*	1	2	3	4	5	6	7
1. Perceived autonomy support	.93	5.28	1.46							
2. Autonomous regulations	.89	2.50	.89	.24**						
3. Extrinsic regulations	.77	1.16	.82	.07	.33*					
4. Amotivation	.70	.35	.57	-.20**	-38**	.11				
5. Vitality	.92	3.62	1.58	.17*	.34**	.01	-.16*			
6. Physical activity intentions	.94	5.02	1.71	.42**	.21**	.08	-.13	.14		
7. Depression	.85	1.08	.62	-.12	-.04	.19*	.07	-.62**	-.05	

Note: $*p<.05$. $**p<.01$

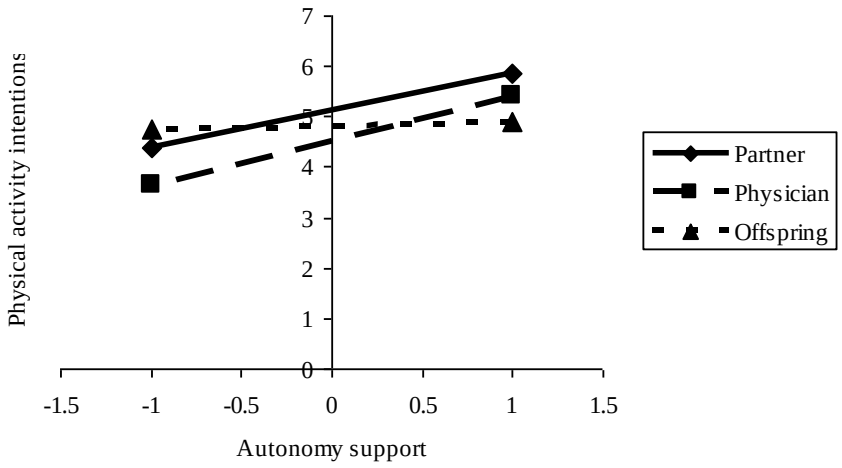
Figure Caption

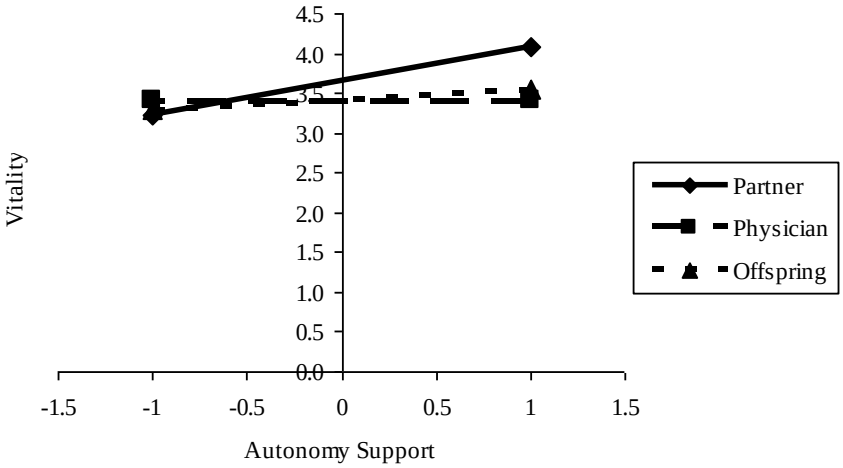
Figure 1a. Significant interactions between three significant others' autonomy support in predicting physical activity intentions.

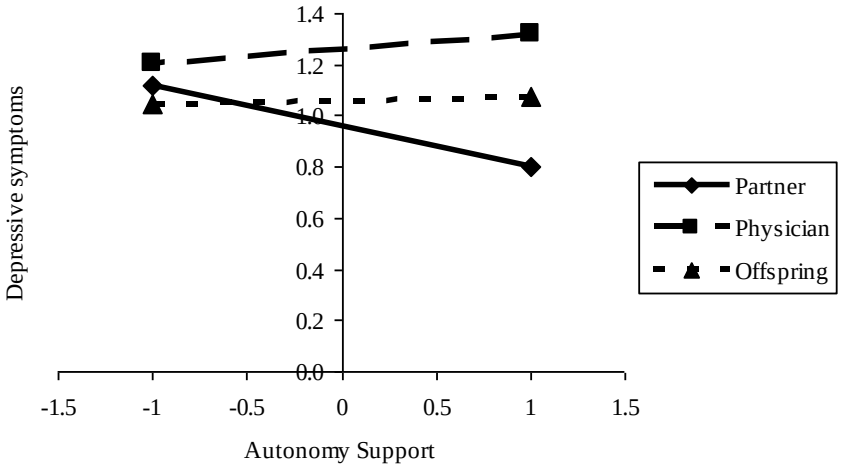
Figure 1b. Significant interactions between three significant others' autonomy support in predicting vitality.

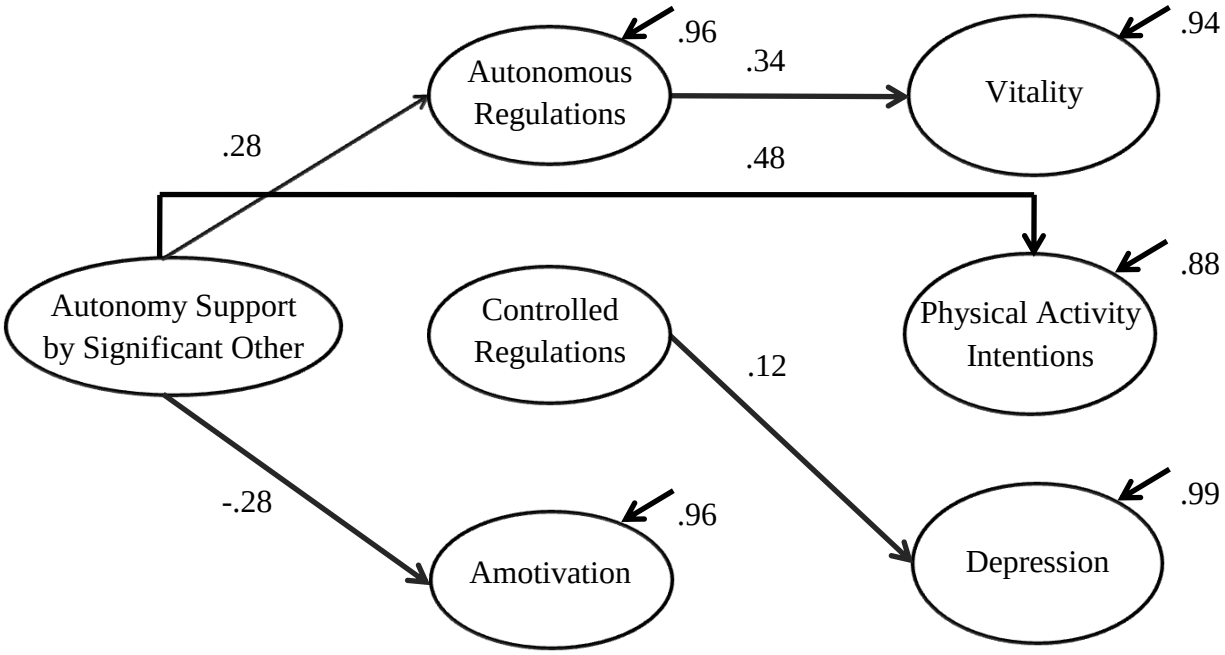
Figure 1c. Significant interactions between three significant others' autonomy support in predicting depressive symptoms.

Figure 2. The re-specified structural model showing the significant path coefficients between autonomy support, exercise regulations, mental health and physical activity intentions.


Physical activity intentions
7
6
5
4
3
2
1
0
-1.5
-1
-0.5
0
0.5
1
1.5
Autonomy support
Partner
Physician
Offspring


Vitality
4.5
4.0
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0.0
-1.5
-1
-0.5
0
0.5
1
1.5
Autonomy Support
Partner
Physician
Offspring


Depressive symptoms
1.4
1.2
1.0
0.8
0.6
0.4
0.2
0.0
-1.5
-1
-0.5
0
0.5
1
1.5
Autonomy Support
Partner
Physician
Offspring



Note: For figure simplicity the correlations between the errors of the indicators of autonomous regulations and controlled regulations, autonomous regulations and amotivation, and vitality and depression are not shown.