

Directionality of effects between non-suicidal self-injury and identity formation:

A cross-lagged prospective study in adolescents

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Abstract

The aim of the present 1-year longitudinal study was to investigate the directionality of association between NSSI and identity formation. We also explored if identity synthesis and identity confusion differed among the control, cessation, onset, and maintenance NSSI groups over a period of one year. We collected data on NSSI and identity from 380 high school students (Mean age = 14.3 years; $SD = 1.68$; range 12 to 19 years; 52.4 % females) using self-report questionnaires at two measurement waves separated by a one-year period. The lifetime prevalence of NSSI at Time 1 was 14.2% and the 12-month prevalence of NSSI at Time 2 was 7.7%. We performed cross-lagged analyses using structural equation modelling techniques to investigate the directionality of effects. Our findings suggest that the associations between NSSI and identity synthesis and confusion are likely to be bi-directional. Mean differences in identity synthesis and confusion were also observed among control, cessation, onset, and maintenance NSSI groups. Clinical implications of these findings are discussed.

Keywords: Non-suicidal self-injury, Identity synthesis, Identity confusion, Cross-lagged analyses, Prospective study, Adolescents

1. Introduction

Non-Suicidal Self-Injury (NSSI) refers to ‘the intentional destruction of one’s body tissue without suicidal intent’ (Nock, 2009). Common forms of NSSI include self-cutting, self-hitting, self-burning, head-banging, etc. Apart from the obvious physical sequelae of scarring and the risk of tissue infections, NSSI is also associated with psychiatric disorders like depression, anxiety, eating disorders, and personality disorders like Borderline Personality disorder (Nock et al., 2006; Peterson, Freedenthal, Sheldon, & Andersen, 2008). NSSI is also related to increased risk of suicidal ideations and suicidal attempts (Nock et al., 2006). NSSI often has its onset in adolescence and its prevalence peaks during 14-15 years of age (Plener, Schumacher, Munz, & Groschwitz, 2015). In fact, a meta-analysis has indicated that NSSI is more prevalent in adolescents than in adults (Swannell, Martin, Page, Hasking, & St John, 2014). As effective treatment modalities for clinical management of NSSI are generally lacking (Calati & Courtet, 2016), identifying factors that increase vulnerability to NSSI is essential for prevention and early intervention.

The onset of NSSI and the subsequent peak in its prevalence coincides with the identity crisis phase of adolescence. According to Erikson, the adolescent identity crisis represents a normative developmental phase of transition in which one’s childhood identity is no longer experienced as suitable, but a new identity is yet to be established (Erikson, 1968). A successful resolution of this crisis leads to identity synthesis, in which adolescents develop a set of self-identified ideals, values, and goals. However, if this crisis persists, identity confusion ensues (Schwartz, 2001). Identity synthesis leads to a coherent sense of self which is consistent across time and is often associated with higher self-esteem, purpose in life, and agency (Schwartz, 2007). On the other hand, identity confusion in adolescents is often associated with the inability

to form intimate relationships, mood swings, rebelliousness, and heightened physical complaints (Erikson, 1950). Persistent identity confusion has also been connected to psychiatric disorders and personality disorder symptoms (Kaynak, Dereboy, & Dereboy, 2009).

Existing qualitative and observational research indicates that disturbances in the process of identity formation and NSSI may be related. For example, based on the online autobiographical accounts of NSSI, Breen, Lewis, and Sutherland (2013) concluded that NSSI may serve as a means of developing a sense of self-identity (“I am a self-injurer”) by connecting with others who engage in similar behaviors. Breen and colleagues also suggested that NSSI may provide a basic sense of a coherent self that can persist across time. Observational studies in community and clinical samples provide more direct evidence for the association between disturbed identity formation and NSSI. For example, in a sample of high school students, Claes, Luyckx, and Bijttebier (2014) found that NSSI was negatively associated with identity synthesis and positively associated with identity confusion. Further, they also reported that identity confusion explained additional variance in lifetime NSSI beyond age, gender, and internalizing symptoms. These findings have been replicated in adolescent community samples (Gandhi, Luyckx, Maitra, Kiekens, & Claes, 2016; Luyckx, Gandhi, Bijttebier, & Claes, 2015) as well as in clinical samples. For example, Claes and colleagues (2015) found that eating disorder patients who engaged in NSSI reported significantly lower identity synthesis and higher identity confusion than eating disorder patients who did not engage in NSSI. This study also found that lack of identity synthesis explained additional variance in lifetime NSSI beyond age, gender, and internalizing symptoms.

Overall, the existing literature suggests that both identity synthesis and identity confusion may be uniquely and incrementally associated with NSSI. However, it is not clear if disturbances

in identity formation precede or are a consequence of NSSI. Cross-sectional research has demonstrated that individuals who engaged in NSSI in the past are more likely to lack identity synthesis, whereas individuals who are currently engaging in NSSI are more likely to be experiencing identity confusion (Luyckx et al., 2015). These findings suggest a bi-directional association between disturbances in identity formation and NSSI such that a more cyclic pattern may be possible. That is, adolescents may engage in NSSI as a means of coping with the emptiness associated with disturbed identity formation, whereas engaging in NSSI may also give rise to developmental delays in identity formation. However, longitudinal research is necessary to confirm this hypothesis.

The present study serves to extend the work of Claes and colleagues (2014) and Luyckx and colleagues (2015) regarding the positive association between adolescents NSSI and disturbances in identity formation. More specifically, using a prospective study design we investigated if disturbances in identity formation in high school students' increases vulnerability to NSSI or if engaging in NSSI increases vulnerability to identity formation (i.e. the directionality of effect between NSSI and identity formation). In line with previous cross-sectional research (Luyckx et al., 2015), we expected this association to be bi-directional. We also explored if there were mean level differences in identity synthesis and identity confusion over a period of 1 year in the following four groups: (1) individuals who did not engage in NSSI at Time 1 and Time 2; (2) individuals who engaged in NSSI only at Time 1 and not at Time 2; (3) individuals who engaged in NSSI only at Time 2 and not at Time 1; and (4) individuals who engaged in NSSI at Time 1 and Time 2. Similar to the previous research, these groups were referred to as control, cessation, onset, and maintenance, respectively (Tatnell, Kelada, Hasking, & Martin, 2014). Given the small number of participants in the aforementioned four groups, this

objective was treated as an exploratory research question. Nonetheless, based on the findings of the cross-sectional studies (Claes et al., 2014; Claes et al., 2015; Gandhi et al, 2016; Luyckx et al., 2015;), we expected the maintenance group to have greater identity disturbances (characterized by lower identity synthesis and higher identity confusion) as compared to the other groups.

2. Method

2.1. Participants and procedure

Data for the present longitudinal study were collected through convenience sampling from high school students located in the Dutch speaking part of Belgium in two measurement waves. The first measurement wave was collected in the beginning of 2015 and the second measurement wave was collected one year later. The students were allowed to participate in the study only if they had informed consent from their parents. Data collection was carried out during school hours. Students were provided with an envelope including an assent/consent form and the questionnaires. They were requested to return completed forms in a sealed envelope to the researchers who were present during the data collection. The same procedure was used at Time 2. Additionally, at Time 2, participants who had completed their high school education or left the school for other reasons were contacted via email and requested to complete the questionnaires online. All students who participated at Time 1 and Time 2 were given a movie ticket as a compensation for participation. To ensure confidentiality, all students were assigned a unique code number. The study was approved by the ethics committee of the Faculty of Psychology and Educational Sciences, University of Leuven.

Out of the total 1,115 students contacted, 528 students participated at Time 1 (50.4% female; 95.5% Belgian nationality). Given the sensitive nature of the research topic and as we

sought parental consent, the lower response rate of 47.35% was not unexpected. The mean age of the participants was 15 years ($SD = 1.84$ years; range 11 to 19 years). Overall, 382 students who participated at Time 1 also participated at Time 2 (Retention rate = 72.07%). Data from two participants were removed due to missing values. Hence, the final sample size consisted of 380 participants (Mean age = 14.3 years; $SD = 1.68$; range 12 to 19 years; 52.4 % females). Attrition analyses indicated that, except for age ($F(1, 354) = 26.33, p = .001$), students who did and did not participate at Time 2 were similar in gender, nationality, and identity variables measured at Time 1. Higher mean age in the participants who left the study was expected as older participants who left the school after completing their high school education mostly did not participate at Time 2. Finally, a chi-square test indicated that attrition (non-participation in Time T2) was not associated with engagement or non-engagement in NSSI at Time 1 ($\chi^2 = .199, p = .656$). Further details of the attrition analysis are presented as an appendix accompanying the current manuscript.

2.2. Measures

2.2.1. Non-suicidal self-injury

At Time 1, we assessed the lifetime prevalence of NSSI by means of a single-item measure (i.e., “Have you ever injured yourself on purpose without an intent to die?”). At Time 2, new cases of NSSI (since Time 1) were again identified by means of a single-item measure (i.e., “In the past 12 months, have you deliberately injured yourself without an intent to die?”). We further assessed lifetime prevalence of seven different forms of NSSI (scratching, carving, cutting, hitting or bruising, burning, pricking with sharp objects, and head banging). At Time 2, the 12-months prevalence of the same seven forms of NSSI were measured again.

2.2.2. Identity formation

The identity subscale of the Erikson's Psychosocial Inventory (EPSI; Rosenthal, Gurney, & Moore, 1981) was used to measure identity synthesis and confusion at Time 1 and Time 2. The EPSI is a 12-item questionnaire that measures the extent to which participants have a clear sense of who they are and what they believe in (Schwartz, Zamboanga, Wang, & Olthuis, 2009). The EPSI has two subscales: identity synthesis (6 items; sample item: "The important things in life are clear to me") and identity confusion (6 items; sample item: "I don't really know who I am"). The Cronbach's alpha coefficient for identity synthesis was .74 both at Time 1 and Time 2. The Cronbach's alpha coefficient for identity confusion at Time 1 was .67 and at Time 2 it was .70. As an alpha coefficient above .60 is considered to be acceptable for scales up to 6 items (Peter, 2002), reliability of all the scales was adequate.

2.3. Data analytic strategy

To establish the directionality of effects between NSSI and identity synthesis /confusion, we performed cross-lagged analyses using structural equation modelling. A cross-lagged model (shown in Figure 1) estimates cross-lagged, within-time, and stability relations between variables that are longitudinally measured. In line with Gandhi et al. (2016), we tested two separate cross-lagged models for synthesis and confusion, using version 7 of Mplus (Muthén & Muthén, 2012). We used the weighted least squares means and variance (WLSMV) adjusted estimation in Mplus as it is the preferred estimator for modelling categorical variables (NSSI at T1 and T2; Brown, 2006). We regressed all the variables in both the models with age and sex to control for these variables. Finally, to investigate if there were significant differences in identity synthesis and confusion among the four NSSI groups over a period of one year, we performed a mixed-design analysis of covariance (i.e., within and between subject factors ANCOVA). Identity synthesis

and confusion were selected as the within-subject factors, the four trajectories (control, cessation, onset, and maintenance) were selected as the between-subject factor, and gender and age were added as covariates.

3. Results

3.1. Descriptive statistics

Lifetime prevalence of NSSI during Time 1 was found to be 14.2%, with higher prevalence in females than in males ($\chi^2_{(1)} = 18.28, p < .001$). Around 20.8% of females and 7.7% of male participants engaged in NSSI at Time 1. In terms of versatility of NSSI, almost 48% of participants who were engaging in NSSI used only one method, whereas 17.3% used two, 17.3% used three, and 12% used four or more different methods of NSSI. Female participants engaged more often in severe cutting, whereas bruising behaviors (head banging and hitting oneself) were the commonly endorsed NSSI methods in male participants (see Table 1). At Time 2, 7.7% (females = 5.3% and males = 2.4%) reported to have engaged in NSSI in the past 12 months. Around 10.1% of females and 5.0% of male participants engaged in NSSI at Time 2. Although no gender differences were observed in 12-month prevalence measured at Time 2 ($\chi^2_{(1)} = 3.36, p = 0.067$), females and males continued endorsing different methods of NSSI. As seen in Table 1, female participants were more likely to engage in cutting, whereas male participants were more likely to engage in head banging. In terms of versatility, 3.7% used one method, 1.3% used two methods, 1.6% used three methods, and .3% used four methods.

In terms of the trajectory of NSSI over a period of one year, it was observed that 319 participants (83.9%) never engaged in NSSI (Control group); 32 participants (8.4%) engaged in NSSI only at Time 1 (Cessation group); 9 participants (2.8%) engaged in NSSI only at Time 2

(Onset group); and, finally, 20 participants (5.3%) engaged in NSSI at both Time 1 and Time 2 (Maintenance group).

3.2. Directionality of association between NSSI and identity variables

Figure 2(a) presents the longitudinal cross-lagged model for NSSI and identity synthesis. Cross-lagged coefficients indicated that identity synthesis at T1 negatively predicted NSSI at T2 whereas NSSI at T1 negatively predicted identity synthesis at T2. Cross-lagged coefficients for NSSI and identity confusion are displayed in the Figure 2(b). Identity confusion at T1 positively predicted NSSI at T2 whereas NSSI at T1 positively predicted identity confusion at T2.

3.3. Exploratory analysis of mean-level differences in identity variables over one year

Within and between subjects factors ANCOVA (Table 2) did not show any significant main effect of time for both identity synthesis ($F(1, 368) = .50, p = .480, \eta_p^2 = .00$) and confusion ($F(1, 368) = 3.04, p = .082, \eta_p^2 = .00$). However, a main effect of group membership was observed for both identity synthesis ($F(3, 368) = 18.72, p < .001, \eta_p^2 = .13$) and identity confusion ($F(3, 368) = 15.30, p < .001, \eta_p^2 = .11$). Post-hoc comparison of estimated marginal means (with Bonferroni's adjustment) indicated that at Time 1, the Maintenance group had a significantly lower mean for identity synthesis than the Control ($p < .001$), Cessation ($p < .001$), and Onset ($p < .001$). Similarly, higher mean for identity confusion was observed in the Maintenance group as compared to the other groups (i.e. Control ($p < .001$), Cessation ($p < 0.001$), and Onset ($p < .001$)). Similarly, at Time 2, as compared to the Control groups, the Maintenance group had a significantly lower mean for identity synthesis ($p < .001$) and a higher mean for identity confusion ($p < .001$).

Further, results also indicated that the time x group membership interaction was significant for identity synthesis ($F(1, 368) = 4.18, p = .017, \eta_p^2 = .02$). Results of the post-hoc

comparison of estimated marginal means (with Bonferroni's adjustment, see Figure 1) showed that although the levels of identity synthesis for the Control ($p = .835$), the Onset ($p = .650$), and the Cessation groups ($p = .159$) did not differ significantly over a period of one year, statistically significant changes were observed only in the Maintenance groups. More specifically, the Maintenance group ($p = .038$) showed a significant increase in identity synthesis. Finally, time x group membership interaction was not significant for identity confusion ($F(1, 368) = 2.32, p = .100, \eta_p^2 = .01$).

4. Discussion

The current study investigated the directionality of the association between NSSI and disturbances in identity formation using prospective data. We supplemented this primary research objective with analyses to explore if levels of identity synthesis and confusion differed among four different NSSI trajectories over a period of one year. The lifetime prevalence of NSSI at Time 1 (14.2%) and the 12-month prevalence of NSSI at Time 2 (7.7%) in our sample was considerably high and highlight the importance of examining factors that increase vulnerability to NSSI especially in adolescents.

In agreement with our expectations, the cross-lagged models tested in the present study indicated presence of a bi-directional association between NSSI and identity synthesis/confusion. The bi-directional association suggests that individuals with disturbed identity formation (characterized by reduced identity synthesis and increased identity confusion) can increase the vulnerability to NSSI. As mentioned above, engaging in NSSI can alleviate disturbances in identity formation more directly by means of the formation of the pseudo-identity of "self-injurer" (Breen et al., 2013). More indirectly though, NSSI can also function as a means of regulating negative emotions that may be an outcome of the persistent identity confusion (Claes

et al., 2014; Claes et al., 2015). However, our results also support the findings of Luyckx et al. (2015) who observed that engagement in NSSI can lead to further identity disturbances (characterized by decrease in identity synthesis and increase in identity confusion). This finding is indicative of the detrimental influence of NSSI on the normative developmental process and re-emphasizes the need for addressing NSSI in adolescents.

Ancillary exploratory analysis involving mean level changes in identity synthesis and confusion in different trajectories of NSSI based on two measurement waves provided additional information regarding the tested relationship. As expected, at both Time 1 and Time 2, individuals who continued to engage in NSSI reported higher disturbances in identity formation (characterized by lower identity synthesis and higher identity confusion) as compared to other groups especially the Control (no NSSI) group. Hence, the levels of identity synthesis and confusion clearly differentiated between participants who never engaged in NSSI and those who engaged in NSSI at both time points. The Cessation group, that is, participants who engaged in NSSI at Time 1 and not at Time 2, did not show any change in values of identity synthesis over a period of one year indicating that engagement in NSSI at Time 1 was not associated with a subsequent increase in disturbances in identity formation.

Finally, only the Maintenance group (participants who engaged in NSSI at both Time 1 and Time 2) showed a significant increase in identity synthesis at Time 2 as compared to the baseline. The increase in identity synthesis observed in the Maintenance group can be attributed to a temporary “recovery” associated with the use of NSSI as an identity substitute (Breen et al., 2013). This strategy appears to be unsuccessful in achieving complete recovery from the disturbances in identity formation as identity synthesis score in these individuals was still significantly lower than individuals who never engaged in NSSI or those who engaged in NSSI

only at Time 1. However, further research is required to confirm this hypothesis. Additionally, research is also required to investigate why increase in identity synthesis from Time 1 to Time 2 is not accompanied by a corresponding decrease in the identity confusion in the maintenance group. The lack of changes in the level of identity confusion can be either attributed to the small sample size or to the fact that identity synthesis and confusion function as independent constructs (Schwartz et al., 2009) rather than as two ends of the same continuum (Erikson, 1968).

In spite of extending the cross-sectional research on the relation between disturbances in identity formation and NSSI, our research is not without limitations. First, one of the main limitation of our study is its smaller sample size. Due to the lack of power, some significant results may have not been detected. Further research with larger samples is therefore warranted. Second, in the present study we used convenience sampling for data collection. Therefore, the possibility of presence of selection bias cannot be ruled out. Further studies using larger, randomized samples may be necessary to validate our findings. Third, we used Erikson's two-dimensional model of identity formation. Prospective research integrating identity dimensions proposed by more nuanced models of identity development may provide a more fine-grained picture of the association between identity and NSSI (Luyckx, Goossens, Soenens, & Beyers, 2006). Fourth, in the current research we only concentrated on the association between identity development and the prevalence of NSSI (lifetime at Time 1 and one-year prevalence at Time 2). Further research may include the relation between identity variables and other features of NSSI like the severity, frequency, and different methods of NSSI (versatility of NSSI). Finally, the development of adolescents is known to be an outcome of a complex interaction between identity formation and other developmentally relevant factors like personality (Klimstra, 2013). More research is needed to investigate the influence of such interactions on the vulnerability to NSSI.

Such research endeavors can also inform the trait specified personality disorder model (especially BPD) introduced in DSM-5 (American Psychiatric Association, 2013) as this alternate model operationalizes personality disorder as an interaction of one's sense of identity and personality traits (Krueger & Markon, 2014)."

Notwithstanding these limitations, our results can have some important implications for the prevention and management of NSSI. First, to some extent, our findings can explain the well-noted difficulty in the treatment of NSSI. A considerable body of existing literature together with the findings of the current study support the observation that adolescents may be engaging in NSSI to form a negative identity (Erikson, 1950) which may compensate for the lack of a consistent sense of self. Hence, treating NSSI without addressing identity issues may be difficult as adolescents may not be willing to forego the only identity they believe they possess. Developing healthy alternative identities in order to enable adolescents to see themselves as someone other than a "self-injurer", "slasher", "cutter", etc. may be a key step in the management of NSSI. Second, within the context of Erikson's psychosocial theory of development, resolution of a conflict of a particular developmental stage depends on successful resolution of previous developmental conflicts. Therefore, the disruptive influence of NSSI on the process of identity formation may extend well beyond adolescence. Adolescents who engage in NSSI may be at higher risk of social isolation and lack skills to develop intimate relationships because of their inability to resolve their identity issues. Hence, in clinical settings, it may be necessary to not only focus on the termination of NSSI but also to address the sequelae that develop as a result of NSSI. Finally, persistently low levels of identity synthesis and high levels of identity confusion coupled with repeated NSSI represents a constellation of symptoms that are common in psychiatric disorders like Borderline Personality Disorder and eating disorders (Claes

et al., 2015; Marcia, 2006). Further research should investigate how identity disturbances and NSSI can interact to contribute in the development of these psychiatric disorders. Furthermore, individuals who exhibit persistent identity disturbances and NSSI may benefit from continued monitoring as early management of these conditions can also have preventive implications in these individuals.

In conclusion, the current research was the first to study the association between normative developmental processes like identity formation and NSSI in community adolescents using a longitudinal design. Our findings support previous theoretical observations, qualitative and quantitative cross-sectional research that adolescents may engage in NSSI to cope with disturbances in identity formation. Using these findings, we also demonstrated that addressing issues of identity formation may be important in the management of NSSI.

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Table 1. Gender wise distribution of seven different forms of NSSI at Times 1 and 2

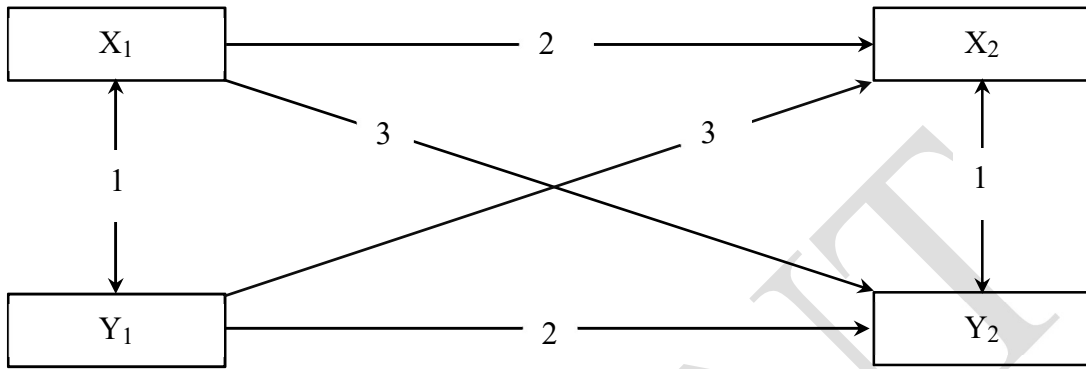
NSSI form	Time 1			Time 2		
	Males	Females	Chi-square	Males	Females	Chi-square
	(n)	(n)	(df ⁺ =1)	(n)	(n)	(df ⁺ =1)
Scratching	5	14	.00	0	4	2.09
Carving	9	29	.35	3	10	.70
Cutting	4	32	8.57*	2	14	5.73*
Hitting or bruising	8	4	11.69*	3	2	2.37
Burning	3	3	1.62	0	0	-
Pricking with sharp objects	3	11	.24	0	3	1.51
Head banging	10	8	10.11*	4	1	6.77*

* $p < 0.05$; ⁺ Degree of freedom

Table 2. Means and standard deviations of identity synthesis and identity confusion at Times 1 and 2 for Control, Cessation, Onset, and Maintenance groups.

	Total		Control		Cessation		Onset		Maintenance	
	Time 1	Time 2	Time 1	Time 2	Time 1	Time 2	Time 1	Time 2	Time 1	Time 2
	<i>n</i> = 374	<i>n</i> = 374	<i>n</i> = 313	<i>n</i> = 313	<i>n</i> = 32	<i>n</i> = 32	<i>n</i> = 9	<i>n</i> = 9	<i>n</i> = 20	<i>n</i> = 20
Identity synthesis	3.70 (.58)	3.71 (.57)	3.78 (.51)	3.78 (.51)	3.51 (.64)	3.47 (.71)	3.78 (.66)	3.53 (.56)	2.78 (.69)	3.09 (.70)
Identity confusion	2.63 (.61)	2.58 (.62)	2.56 (.54)	2.52 (.58)	2.81 (.77)	2.79 (.76)	2.43 (.65)	2.73 (.70)	3.51 (.54)	3.22 (.61)

Figure 1. Cross-lagged model (1: within-time relations; 2: stability relations; 3: cross-lagged relations)



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Figure 2. Cross-lagged path model linking NSSI and identity synthesis (a) and identity confusion (b). Only the significant relations are shown. Both models were controlled for age and sex. Both models were saturated. Associations between age and sex are not shown.

* $p < .05$, ** $p < .01$, *** $p < .001$.

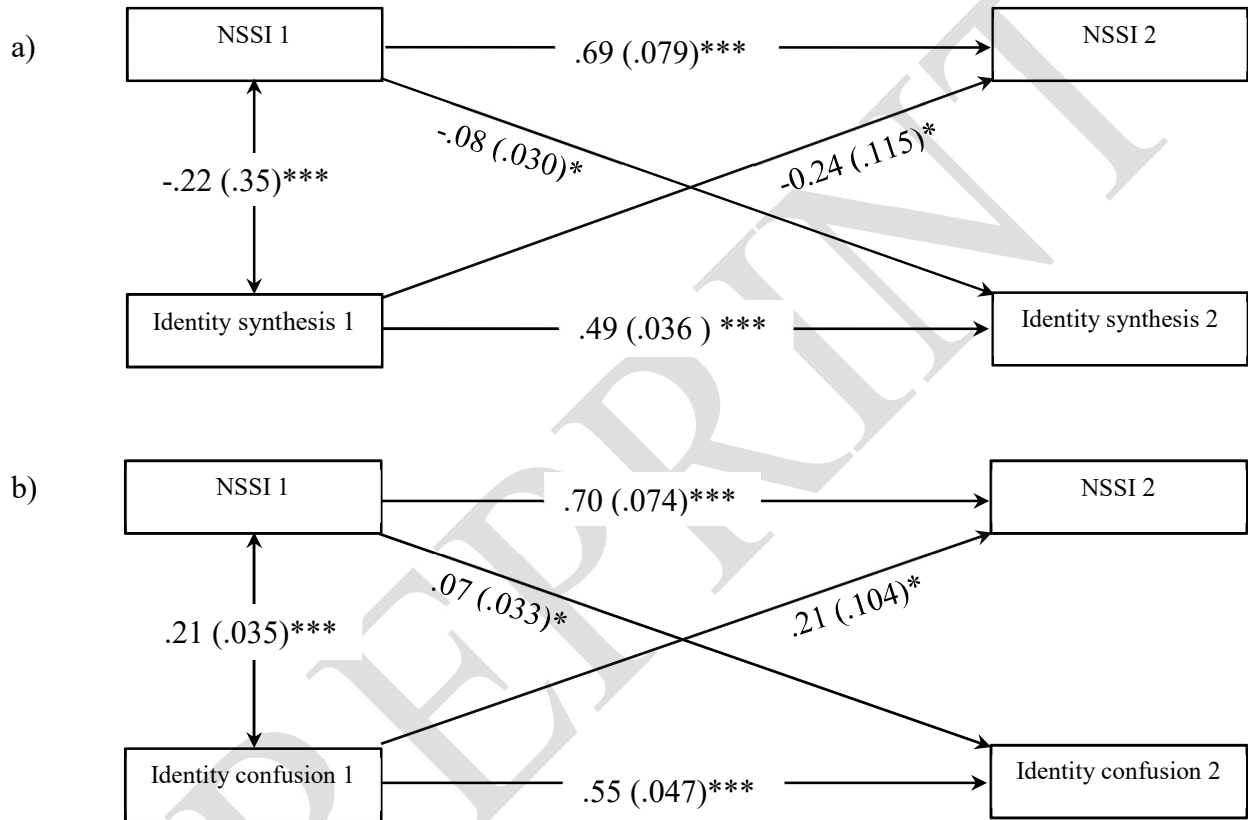
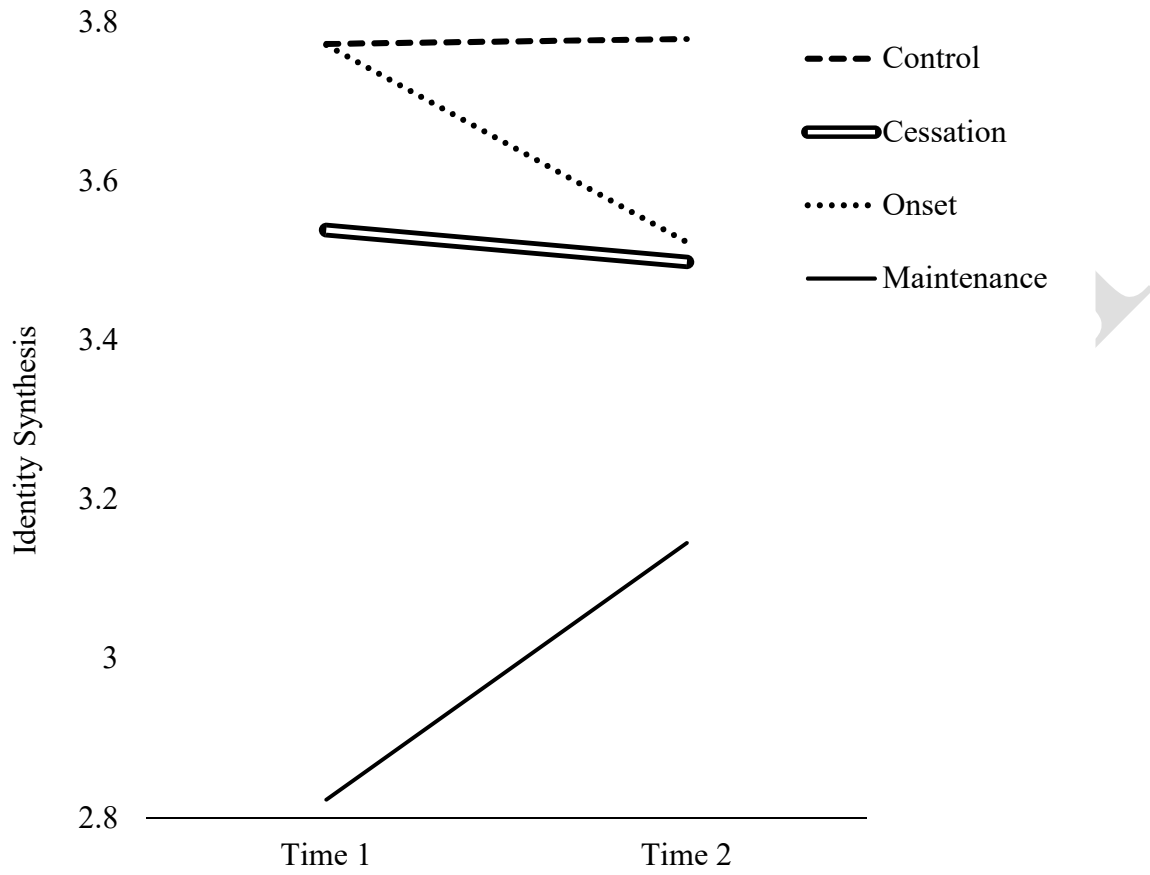


Figure 3. Changes in the estimated marginal means of identity synthesis for the Control, Cessation, Onset, and Maintenance groups at Time 1 and Time 2.



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